

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

MEMORANDUM

TO: John Mitnik, Assistant Executive Director, Executive Office Staff

FROM: SFWMD Staff Environmental Advisory Team

DATE: December 30, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Winds from the northeast, east, and then southeast will bring some scattered showers mainly over eastern areas through Thursday yielding light rainfall totals each day. Scattered light showers are forecast to develop mainly over the interior during the afternoon Friday as moisture increases ahead of a cold front, which is expected to temporarily stall across north Florida late Friday night. A trough moving through the southeastern US is forecast to provide a second push of the front through the District Sunday. Showers and a few thunderstorms should move in from the northwest early Sunday and then shower activity is forecast to decrease in intensity and coverage as the front moves into south Florida by Sunday evening. Drier conditions should then spread over the District behind the front by Monday morning. Total rainfall is forecast to be below the historical average during the first 7-day period (Week 1) and near the historical average during the second 7-day period (Week 2).

Kissimmee

Tuesday morning stages were 57.9 feet NGVD (0.1 feet below schedule) in East Lake Toho, 54.9 feet NGVD (0.1 feet below schedule) in Toho, and 52.4 feet NGVD (0.1 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.4 feet NGVD at S-65A and 25.9 feet NGVD at S-65D. Tuesday morning discharges were 710 cfs at S-65, 800 cfs at S-65A, 1,080 cfs at S-65D and 1,100 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 7.5 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.58 feet. Today's recommendation is to continue S-65/S-65A discharge at or below 800 cfs. The purpose is to allow for 2-3 weeks with flow below 800 cfs before construction in Pool D resumes in early January 2021.

Lake Okeechobee

Lake Okeechobee stage was 15.82 feet NGVD on December 27, 2020, 0.10 feet lower than last week and 0.34 feet lower than a month ago. The Lake is currently in the Low Sub-band. Stage has been above or near the top of the preferred ecological envelope since August 1, 2020 and is currently 0.32 feet above. Recent satellite imagery and water quality results suggest little to no bloom activity on the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged more than 1,545 cfs over the past week with approximately 1,177 cfs coming from Lake Okeechobee. The seven-day average salinities increased to the US1 Bridge and decreased slightly at the A1A Bridge over the past week. Salinity at the US1 Bridge is in the good range (5-10) for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 1,927 cfs over the past week with approximately 1,229 cfs coming from the Lake. Seven-day average surface salinities remained almost fresh (0.2) at the three most upstream sites (S-79, Val I75 and Ft. Myers Yacht Basin) and relatively stable at the downstream sites over the past week. Salinities

are in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities are in the good range (10-30) for adult eastern oysters at Shell Point and Sanibel, and in the poor range (0-5) at Cape Coral. Lake stage is in the Low Sub-Band of 2008 LORS. Tributary hydrological conditions are wet. The LORS2008 Release Guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.

Stormwater Treatment Areas

Over the past week, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 97,000 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,502,000 ac-feet. Most STA cells are near or above target stage. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, and STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to discharge canal plug construction activities, in STA-1E Central Flow-way, STA-2 Flow-ways 1, 3, 4 and 5, STA-3/4 Eastern, Central, and Western Flow-ways for vegetation management activities, and in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

Everglades

For the second week in a row at all the gauges monitored for this report the WCA stages fell within the early dry season WY21 recession recommendations last week except in northeastern WCA-3A. Depths remain above average in Taylor Slough and salinities in Florida Bay fell on average, and also remain below historical average for this time of year. High concentrations of wading birds were noted along the southern coast last week, indicating good foraging conditions moving towards nesting season. If a near optimal recession continues many more wading birds are expected in high numbers within the central Everglades soon.

Supporting Information

Rainfall

The Upper Kissimmee Basin received 0.25 inches of rainfall in the past week and the Lower Basin received 0.10 inches (SFWMD Daily Rainfall Report December 28, 2020).

Upper Kissimmee

Table 1 lists stage and discharge for several KCL water bodies using data from lake outfall structures. KCL stage hydrographs with respective regulation schedules and rainfall are shown in **Figures 1-3**.

Table 1. Average discharge (cfs) for the preceding seven days, stage (feet NGVD), and departures from KCL flood regulation (R) or temporary schedules (T, A, or S); provisional, real-time data are from SFWMD.

Report Date: 12/29/2020

Water Body	Structure	7-day Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Schedule Stage (feet)	Daily Departure (feet)						
							12/27/20	12/20/20	12/13/20	12/6/20	11/29/20	11/22/20	11/15/20
Lakes Hart and Mary Jane	S-62	96	LKMJ	60.9	R	61.0	-0.1	0.0	0.1	-0.1	0.0	0.1	0.1
Lakes Myrtle, Preston, and Joel	S-57	33	S-57	61.7	R	61.7	0.0	0.0	0.0	-0.1	0.0	0.1	0.0
Alligator Chain	S-60	110	ALLI	64.0	R	64.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Lake Gentry	S-63	157	LKGT	61.5	R	61.5	0.0	0.0	0.1	-0.1	0.1	0.1	0.0
East Lake Toho	S-59	329	TOHOE	57.9	R	58.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.1
Lake Toho	S-61	666	TOHOW, S-61	55.0	R	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S-65	729	KUB011, LKIS5B	52.5	R	52.5	0.0	0.0	0.0	0.2	0.3	0.4	0.4

¹ Seven-day average of weighted daily means through midnight.

² Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

³ A = projected ascension line, R = USACE regulation schedule, S = temporary recession target line, T = temporary schedule, N/A= not applicable or data not available.
DATA ARE PROVISIONAL

Lower Kissimmee

Discharges at lower basin structures are shown in **Table 2**. **Figure 4** compares floodplain inundation depths from one year and one month ago with current inundation depths in the Phase I restored area of the Kissimmee River. **Figure 5** shows dissolved oxygen concentration along with S-65A discharge, water temperature and rainfall. **Figures 6-8** are included for reference: **Figure 6** is the current guide for operation of S-65 and S-65A, called the “Preferred Discharge Plan IS-14-50.0”. This is developed collaboratively each year between ecologists and SFWMD water managers based on prevailing ecological and hydrologic conditions. A preferred discharge plan and the interim regulation schedule (**Figure 7**) will be used until the Headwaters Lakes Revitalization regulation schedule is implemented. **Figure 8** is a map of the Kissimmee Basin showing Central and Southern Florida (C&SF) flood control project structures and color-coded watersheds.

Table 2. One- and seven-day average discharge at lower basin structures, dissolved oxygen concentration in phases I and II/III area river channel, and depth in the Phase I area floodplain using provisional, real-time data from SFWMD.

Report Date: 12/29/2020

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹							
		12/27/2020	12/27/20	12/20/20	12/13/20	12/6/20	11/29/20	11/22/20	11/15/20	11/8/20	11/1/20
Discharge (cfs)	S-65	711	729	848	1,382	1,083	842	784	385	187	209
Discharge (cfs)	S-65A ²	801	809	974	1,566	1,275	1,108	1,095	724	361	330
Discharge (cfs)	S-65D ²	1,076	1,317	1,704	1,605	1,497	1,541	1,685	1,590	797	1,122
Headwater Stage (feet NGVD)	S-65D ²	25.79	25.73	26.08	26.40	26.82	26.99	26.98	27.03	26.94	27.35
Discharge (cfs)	S-65E ²	995	1,314	1,710	1,687	1,545	1,657	1,835	1,904	895	1,283
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	8.6	7.5	6.4	7.2	6.0	5.3	4.7	5.2	5.6	3.8
Mean depth (feet) ⁴	Phase I floodplain	0.58	0.68	1.00	1.01	0.90	0.93	0.94	0.75	0.52	0.67

¹Seven-day average of weighted daily means through Sunday midnight.

²S-65A discharge combines S-65A with auxiliary structures; S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.

³DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.

⁴1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

DATA ARE PROVISIONAL; N/A indicates that data were not available.

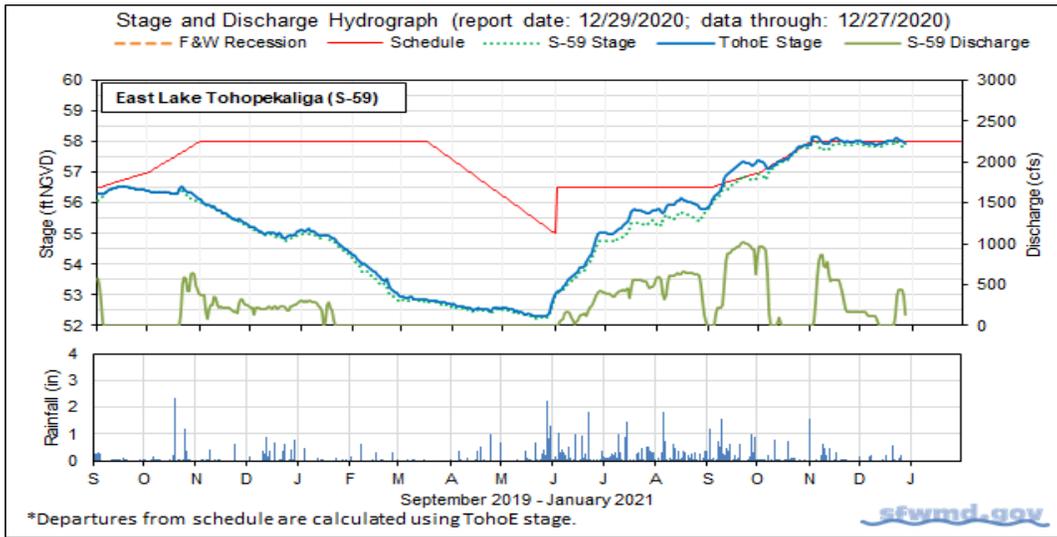


Figure 1. East Lake Toho regulation schedule, stage, discharge and rainfall.

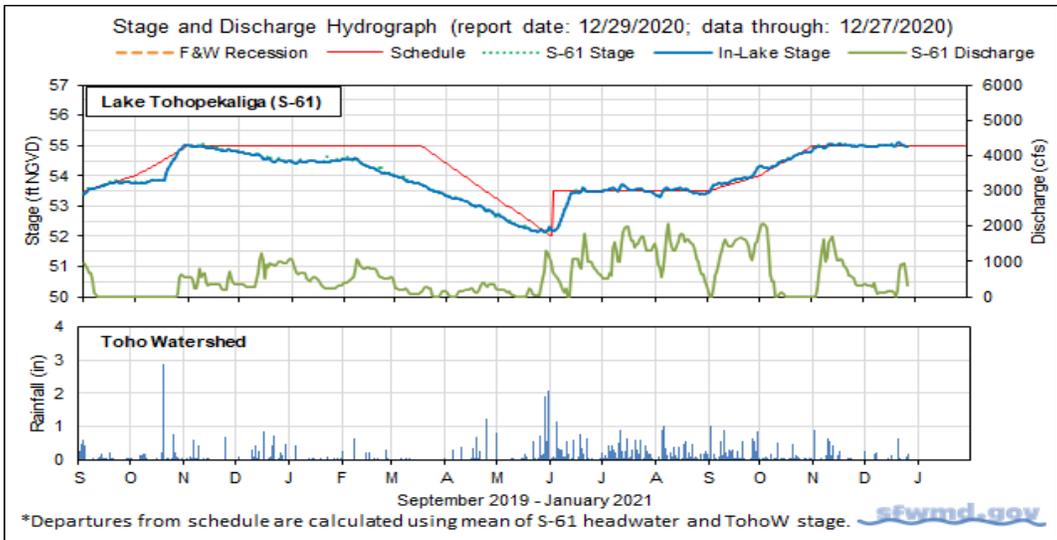


Figure 2. Lake Toho regulation schedule, stage, discharge and rainfall.

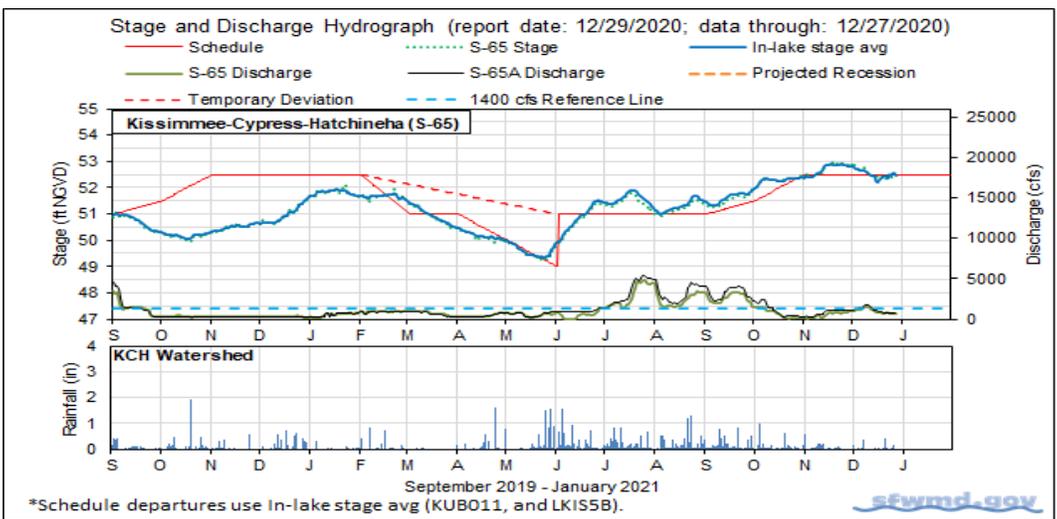


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

Kissimmee River Phase I Restoration Area Water Depth Maps

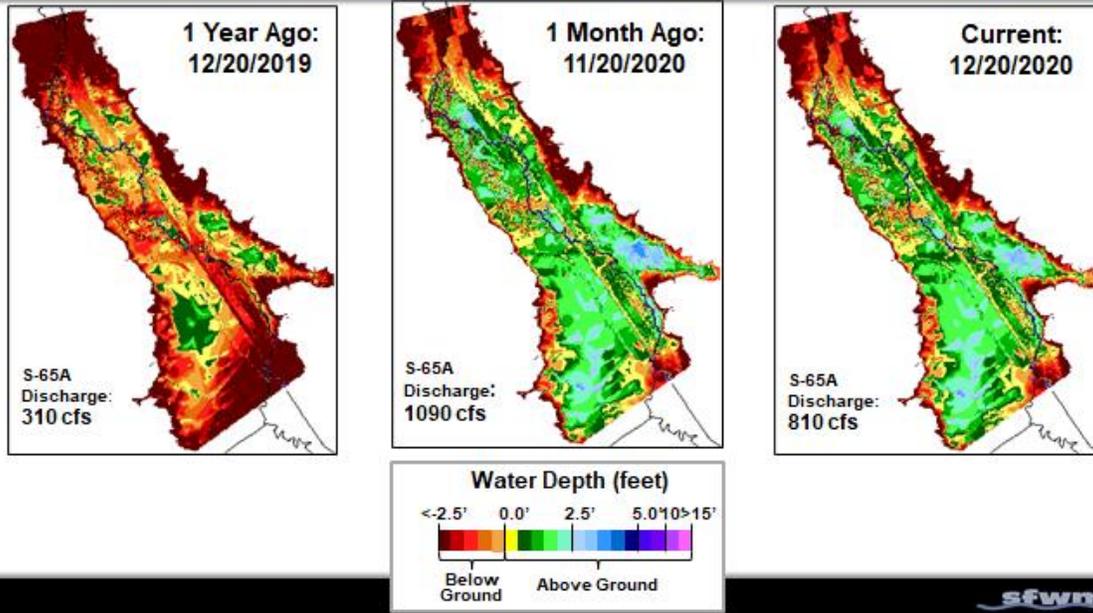


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

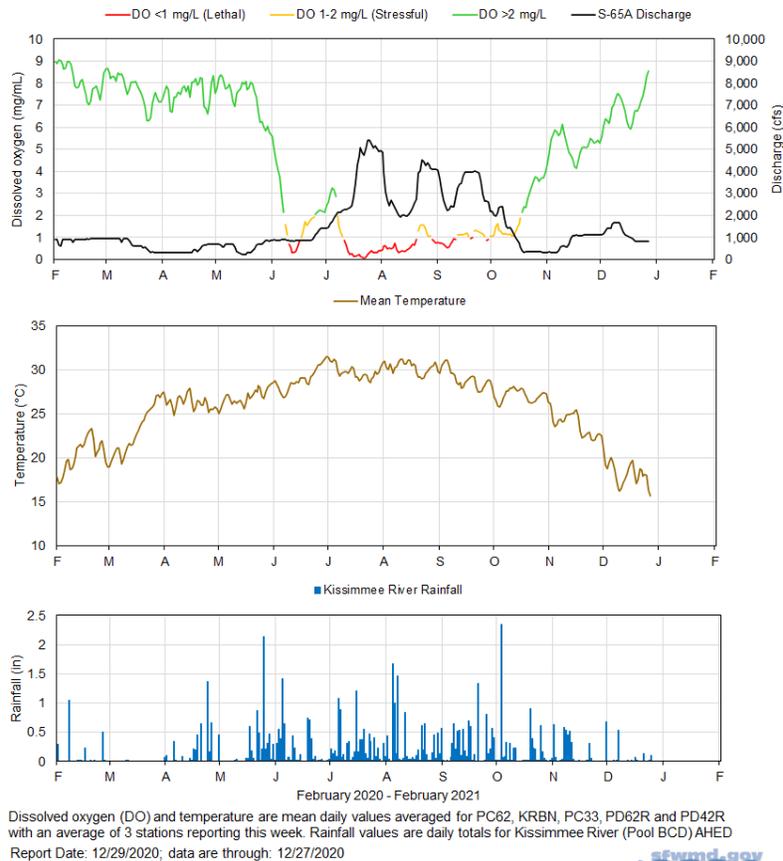


Figure 5. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches)

Stage and Discharge Guidance for 2019-2020.

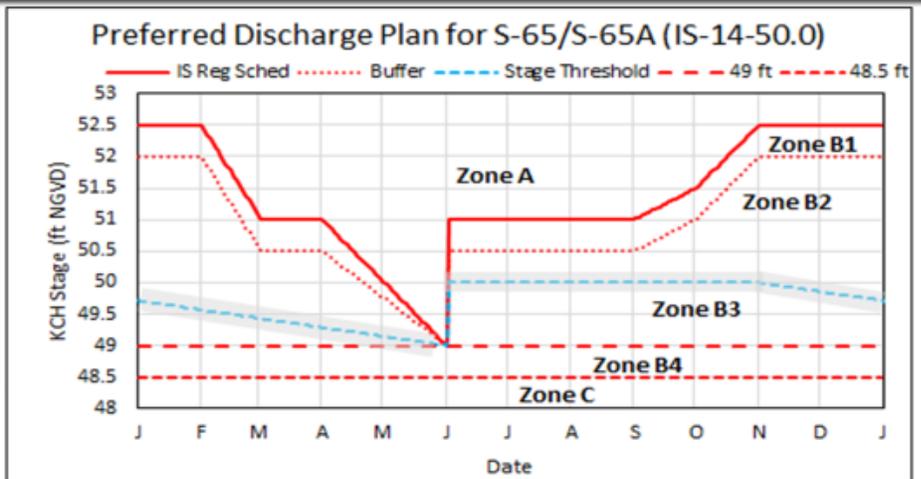
Zone	KCH Stage (ft NGVD)	S-65/S-65A Discharge*
A	Above regulation schedule line.	Flood control releases as needed with no limits on the rate of discharge change.
B1	In flood control buffer zone (0.5 ft below the schedule line).	Adjust S-65 discharge so that S-65A discharge is between 1400 cfs at the buffer zone line and 3000 cfs at the schedule line.
B2	Between the Flood Control Buffer and the 50.0 ft line.	Adjust S-65 discharge to maintain at least 1400 cfs at S-65A. Use ± 0.2 ft buffer (gray band) above and below the 50.0 ft line to decide when to begin ramping up to 1400 cfs or down to 300 cfs; do not continue reducing discharge if stage rises back to or above the threshold stage line.
B3	Between the 50.0 ft line and 49 ft.	Adjust S-65 discharge to maintain at least 300 cfs at S-65A.
B4	Between 48.5 ft to 49 ft.	Adjust S-65 discharge to maintain S-65A discharge between 0 cfs at 48.5 ft and 300 cfs at 49 ft.
C	Below 48.5 ft.	0 cfs.

*Changes in discharge should not exceed limits in inset table below.

Discharge Rate of Change Limits for S65/S65A (revised 7/13/18).		
Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
0-300	50	-50
301-650	75	-75
651-1400	150	-150
1401-3000	300	-600
>3000	1000	-2000

Revised 5/16/2019

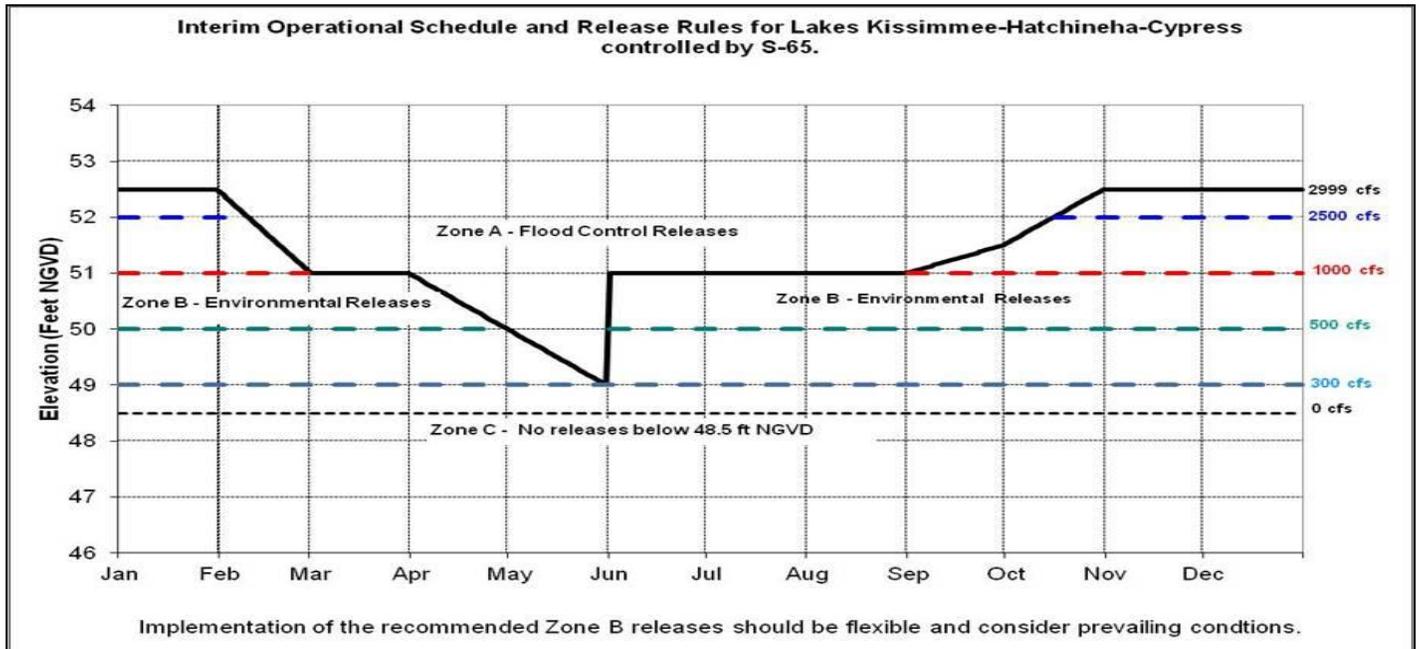
2019-2020 Discharge Plan S-65/S65A



Other Considerations

- When possible, limit lake ascension rate in the Jun 1 - Aug 15 window to 0.5 ft per 14 days in Lakes Kissimmee, Cypress, Hatchineha (S-65), East Toho (S-59) and Toho (S-61).
- If outlook is for extreme dry conditions meet with KB staff to discuss modifications to this plan.

Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.



Implementation of the recommended Zone B releases should be flexible and consider prevailing conditions.

Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.

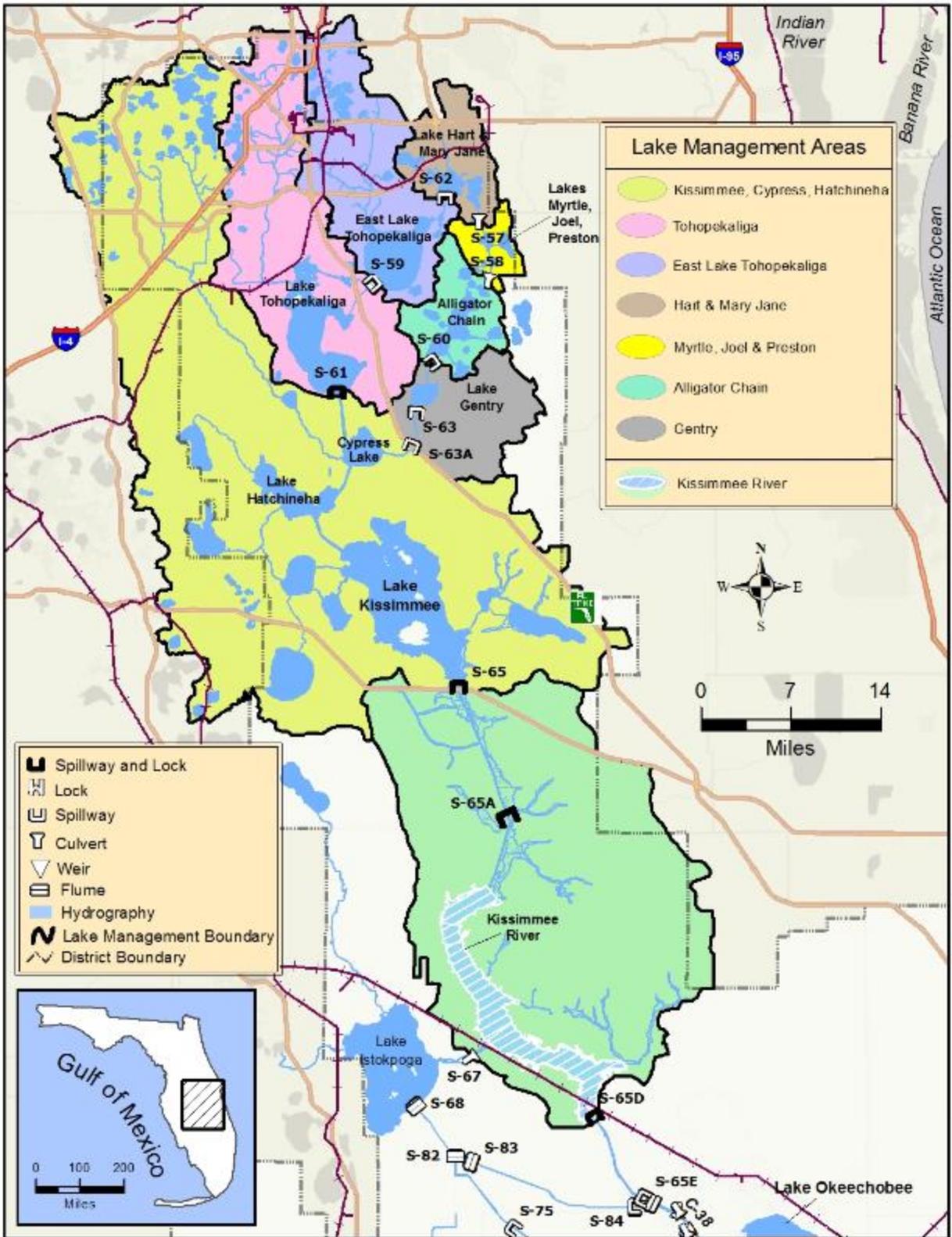


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 15.82 feet NGVD, 0.34 feet lower than a month ago, and 2.79 feet higher than one year ago (Figure 1). Lake stage rose into the lower portion of the preferred ecological envelope on June 2, 2020 (Figure 2) but has been above the envelope since August 1, 2020; currently at 0.32 feet above. Lake stage reached a low of 10.99 feet on May 17, 2020 and a high of 16.45 feet on November 12, 2020 (post Tropical Storm Eta), a difference of 5.5 feet (Figure 3). Lake stage has declined since mid-November and is currently in the Low sub-band. According to RAINDAR, approximately 0.12 inches of rain fell on the Lake with most of the watershed receiving less than 0.5 inches. A few areas along the extreme southeast coastline received up to 0.75 inches (Figure 4).

Average daily inflows (excluding rainfall) were lower than the previous week, decreasing from 2,576 cubic feet per second (cfs) to 2,267 cfs. Outflows (excluding evapotranspiration) increased from 3,074 cfs to 3,191 cfs. Most of the inflows collectively came from the Kissimmee River (1,314 cfs through S-65E & S-65EX1) and the C-41a canal (466 cfs through S-84 & S-84X). Releases to the west via S-77 decreased from 2,116 cfs to 1,420 cfs, while releases east via S-308 increased from last week from 880 cfs to 1,748 cfs. Average inflows and outflows through water control structures surrounding the Lake for the previous two weeks (cfs) are shown in Table 1. The resultant Lake elevation change (in) due to each structure's flow for the past week is also shown in Table 1. Figure 5 shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional and are subject to change.

Water quality sampling is now on the non-bloom season schedule (November – April), occurring once monthly at approximately 30 stations for chlorophyll *a*, and at 9 stations for taxonomic identification and toxin analyses. The December sampling occurred on the 15th and 16th and four of the nine toxin samples had levels above detection but still well below the EPA recreational waters recommendation of 8 µg/L (Figure 6). Nineteen chlorophyll *a* samples have been analyzed and all levels were below the bloom threshold of 40 µg/L, the highest of which was 25.5 µg/L.

The most recent satellite image (December 25, 2020) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed continued low bloom potential on the Lake (Figure 7).

Water Management Summary

Lake Okeechobee stage was 15.82 feet NGVD on December 27, 2020, 0.10 feet lower than last week and 0.34 feet lower than a month ago. The Lake is currently in the Low Sub-band. Stage has been above or near the top of the preferred ecological envelope since August 1, 2020 and is currently 0.32 feet above. Recent satellite imagery and water quality results suggest little to no bloom activity on the Lake.

Table 1. Average daily inflows and outflows for the most recent two weeks and approximate depth equivalents on Lake Okeechobee for various structures.

INFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)	OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-65E & S-65EX1	1710	1314	0.5	S-77	2116	1420	0.5
S-71 & S-72	177	219	0.1	S-308	880	1748	0.7
S-84 & S-84X	375	466	0.2	S-351	26	6	0.0
Fisheating Creek	125	144	0.1	S-352	28	5	0.0
S-154	25	17	0.0	S-354	23	12	0.0
S-191	0	0	0.0	L-8 Outflow			
S-133 P	34	33	0.0	ET	1488	1681	0.6
S-127 P	5	20	0.0	Total	4562	4872	1.9
S-129 P	3	13	0.0				
S-131 P	3	6	0.0				
S-135 P	119	32	0.0				
S-2 P	0	0	0.0				
S-3 P	0	0	0.0				
S-4 P	0	0	0.0				
L-8 Backflow	1	4	0.0				
Rainfall	430	320	0.1				
Total	3006	2586	1.0				

Provisional Data

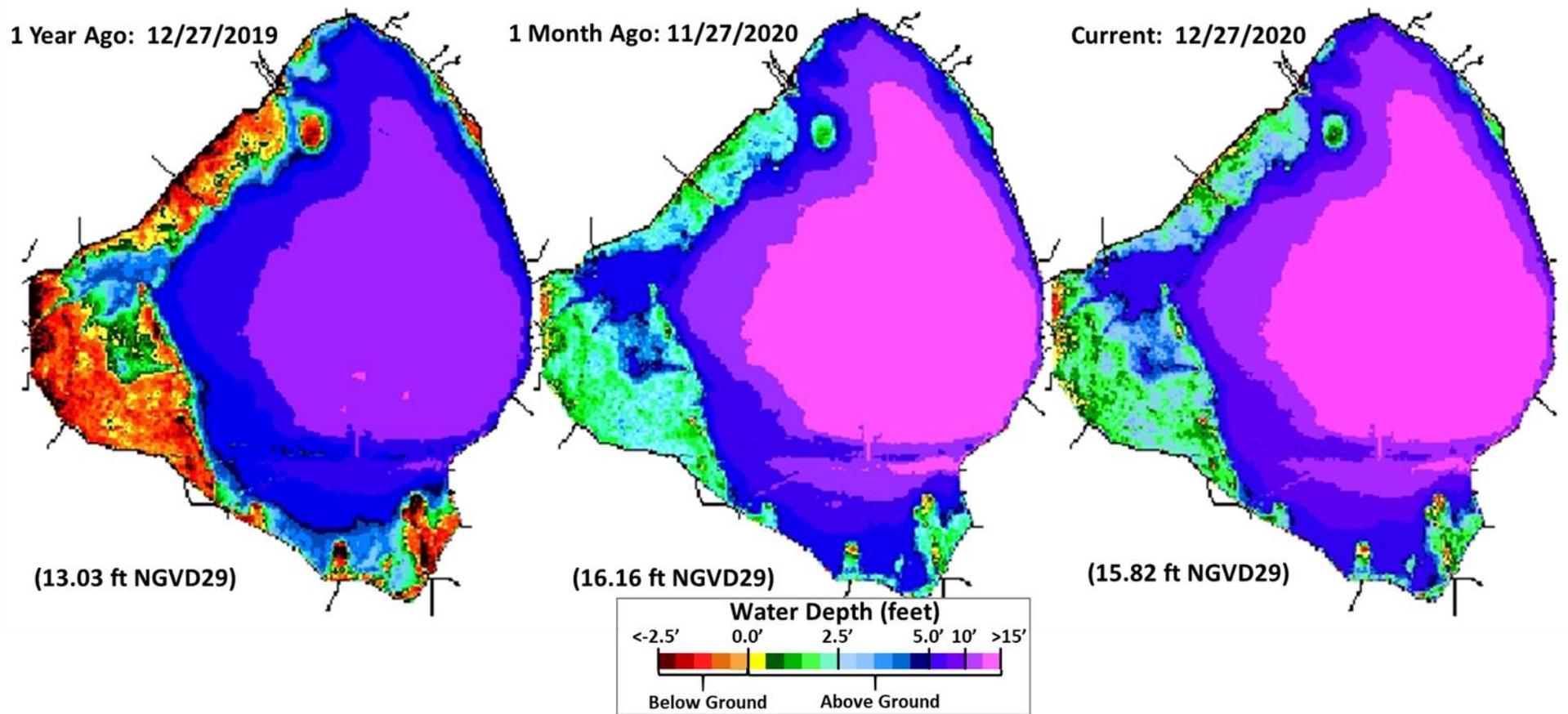


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Stage vs Updated Ecological Envelope

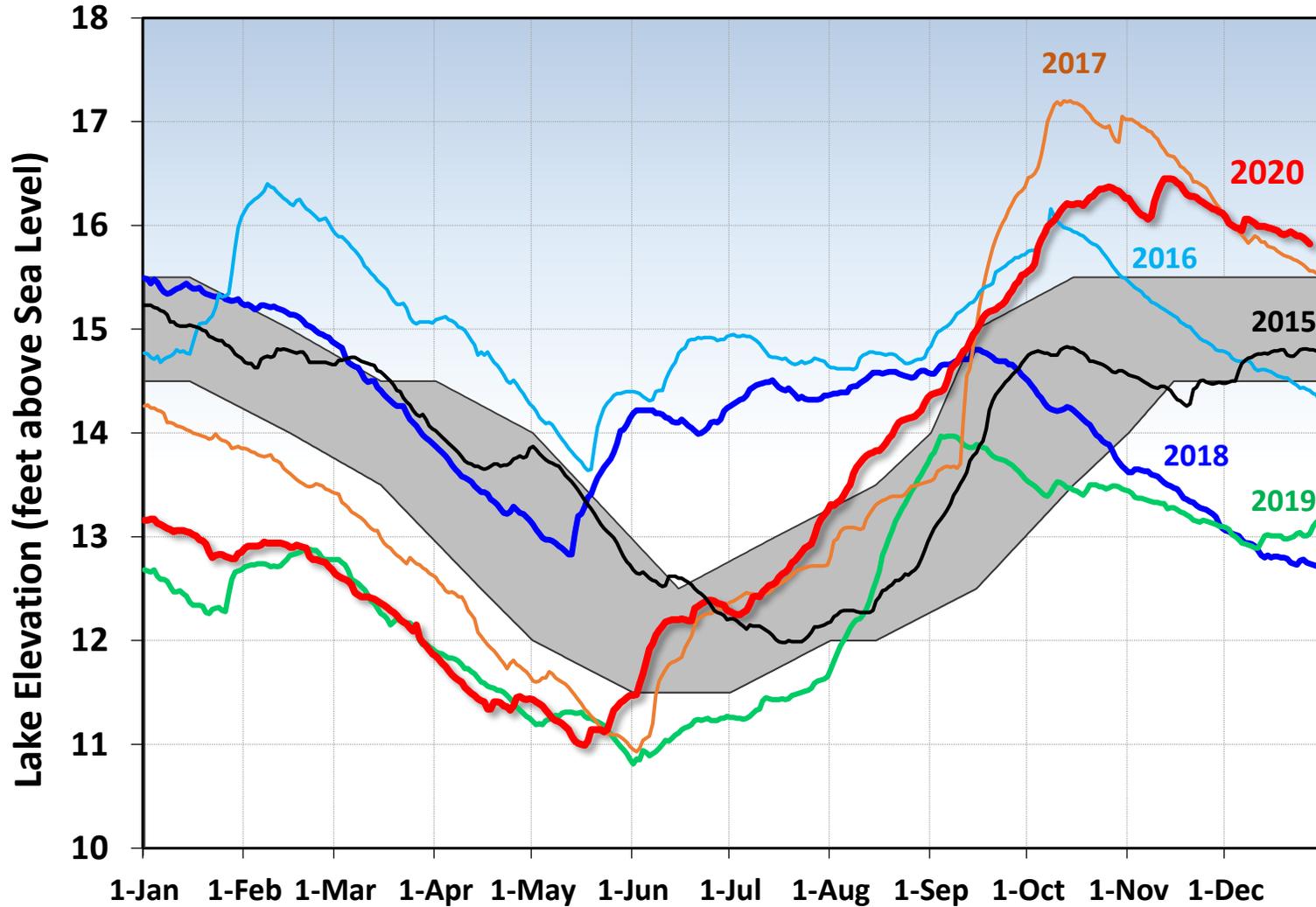


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages

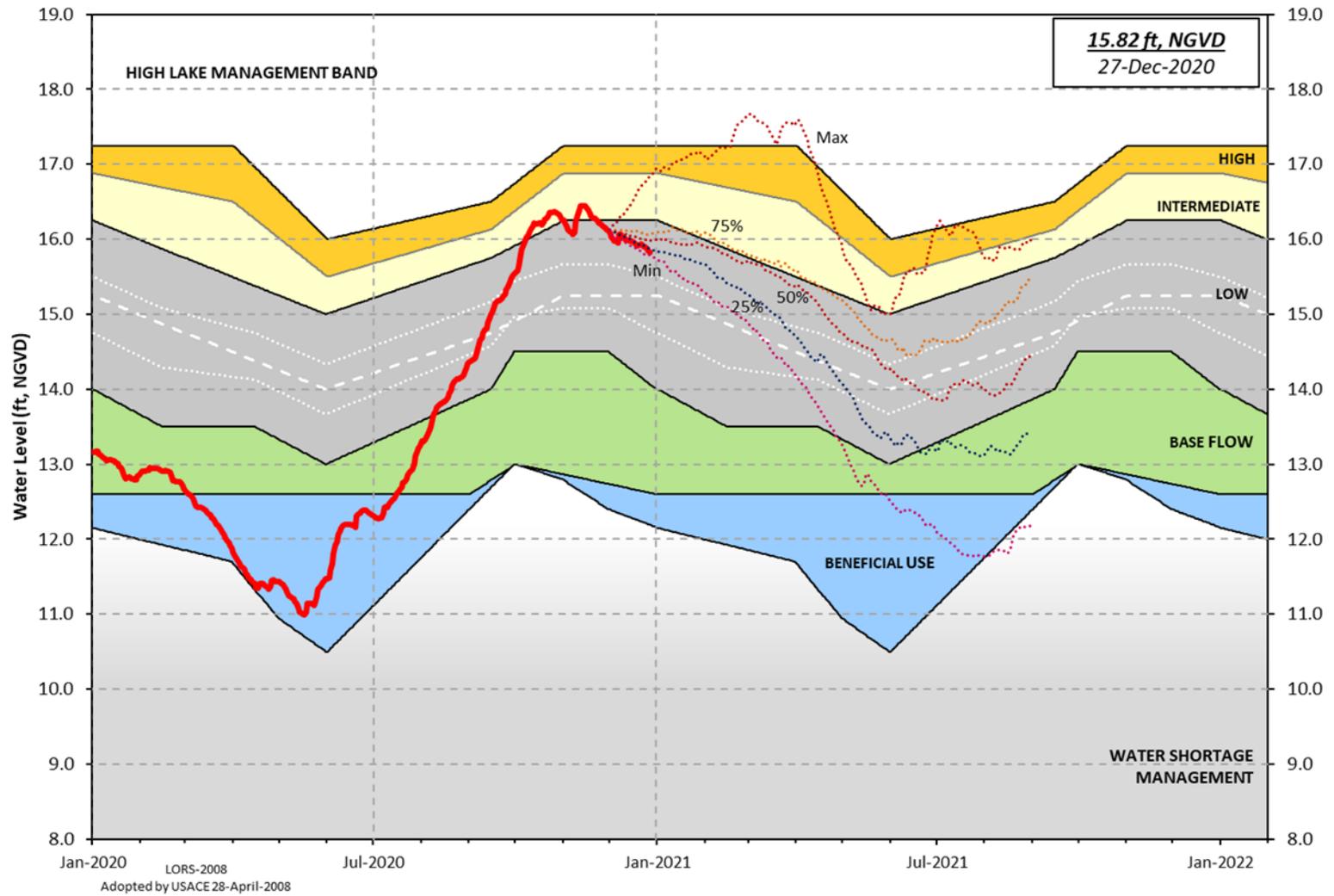


Figure 3. Recent Lake Okeechobee stages and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 0700 EST, 12/21/2020 THROUGH: 0700 EST, 12/28/2020

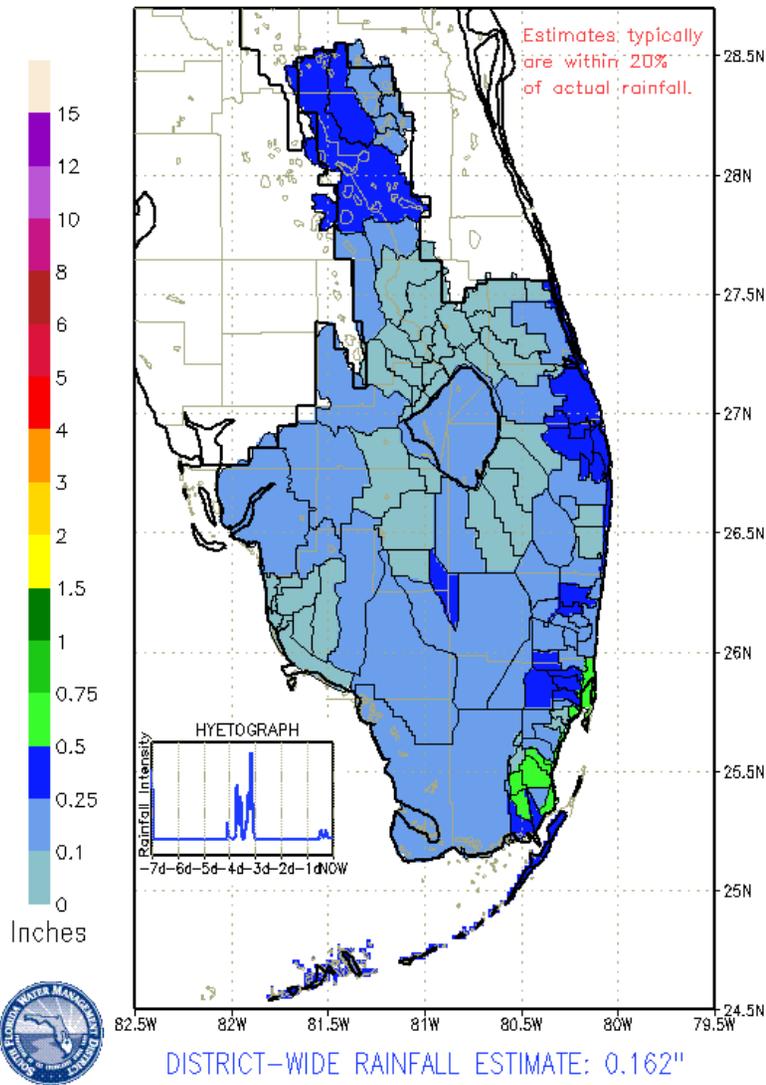


Figure 4. 7-Day rainfall estimates by RAINDAR.

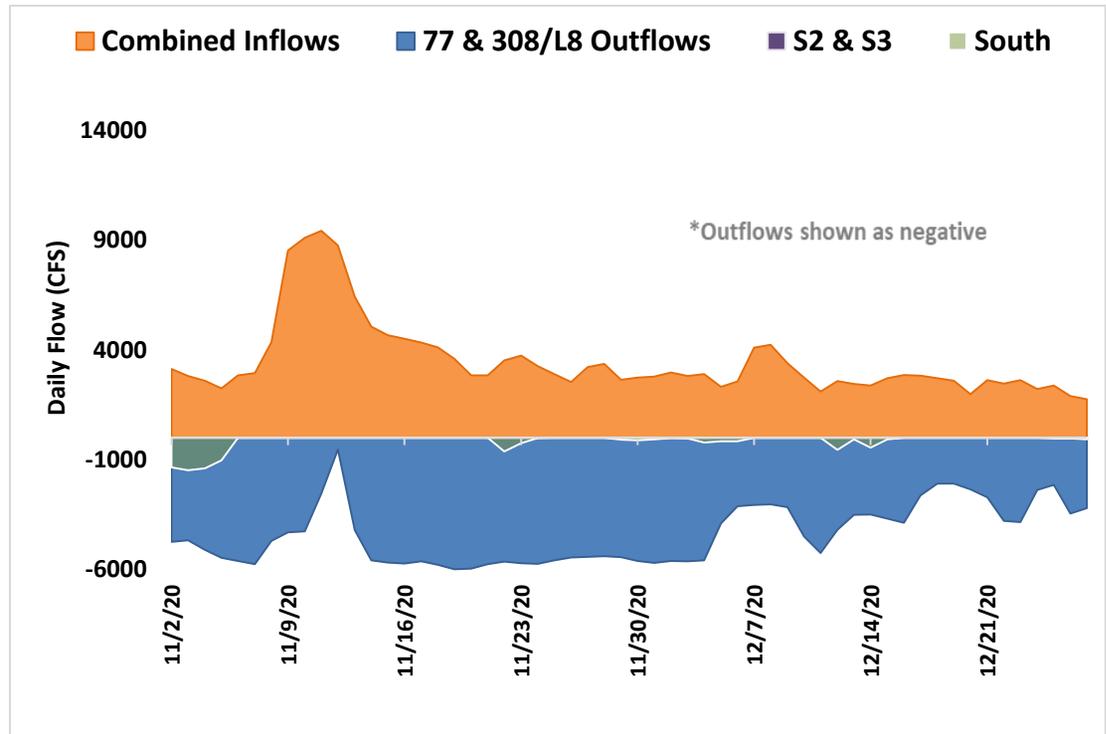


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes. Outflows through the S-77 and S-308 structures are shown based on their downstream gauges to account for lock openings for navigation.

Collection Date: December 15-16, 2020

Station	CHL α (ug/L)	TOXIN (ug/L)	TAXA
FEBIN _(12/7)	13.0		
FEBOUT _(12/7)	24.7		
KISSR0.0	12.7	0.3	<i>Micro/Micro</i>
L005	24.5	BDL	<i>Microcys</i>
LZ2	9.4	0.3	mixed
KBARSE	16.4		
RITTAE2	P	0.4	<i>Microcys</i>
PELBAY3	P		
POLE3S	P		
LZ25A	P		
PALMOUT	P	0.6	<i>Microcys</i>
PALMOUT1	P		
PALMOUT2	P		
PALMOUT3	P		
POLESOUT	15.5	BDL	mixed
POLESOUT1	24.0		
POLESOUT2	11.0		
POLESOUT3	25.5		
EASTSHORE	16.3		
NES135	24.4		
NES191	14.8		

Station	CHL α (ug/L)	TOXIN (ug/L)	TAXA
L001	10.8		
L004	16.9		
L006	P		
L007	P		
L008	19.9		
LZ30	P	BDL	mixed
LZ40	P		
CLV10A	P	BDL	mixed
NCENTER	14.4		

Sampled 12/14

S308C	4.5	BDL	mixed
S77	4.4		

- SFWMD considers >40 $\mu\text{g/L}$ Chlorophyll *a* (Chl α) an algal bloom
 - BDL – Below Detectable Limit of **0.25** $\mu\text{g/L}$
 - ND – No Dominant taxa
 - P – Pending
 - NS – Not Sampled
 - Bold – crew observed possible BGA
 - Chlorophyll *a* analyzed by SFWMD
 - Toxin and Taxa analyzed by FDEP
- Cylindro* = *Cylindrospermopsis*
Planktol = *Planktolyngbya*
Dolicho = *Dolichospermum*

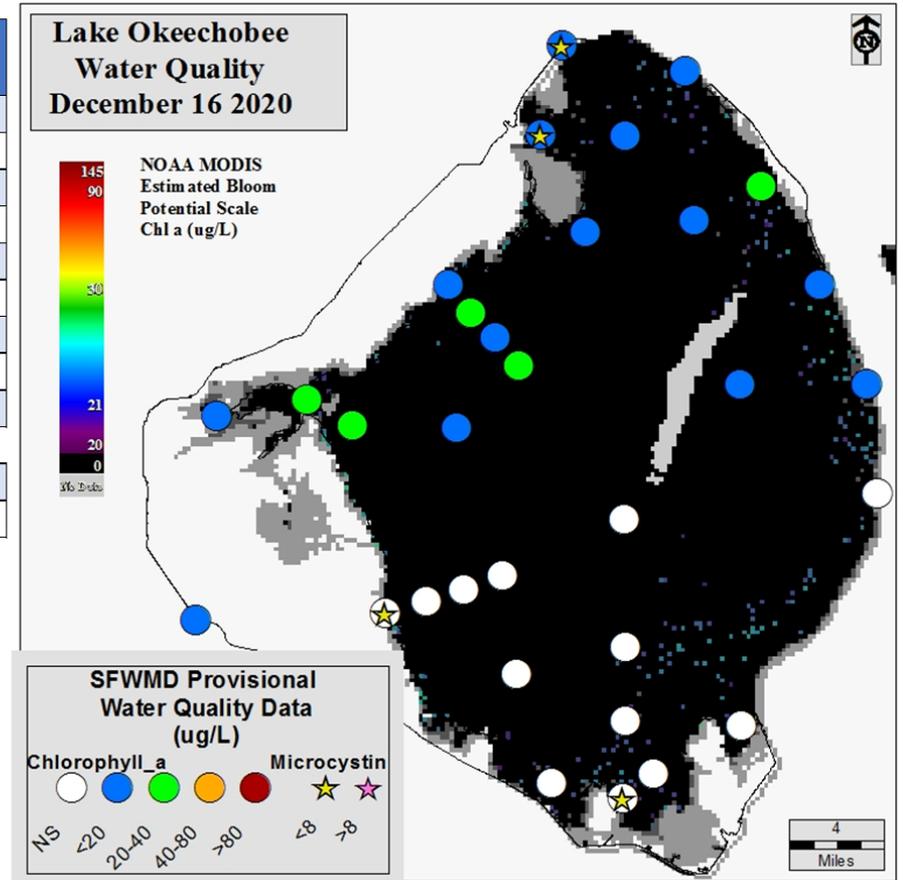


Figure 6. Provisional results from the expanded monitoring sampling trips on December 15 - 16, 2020.

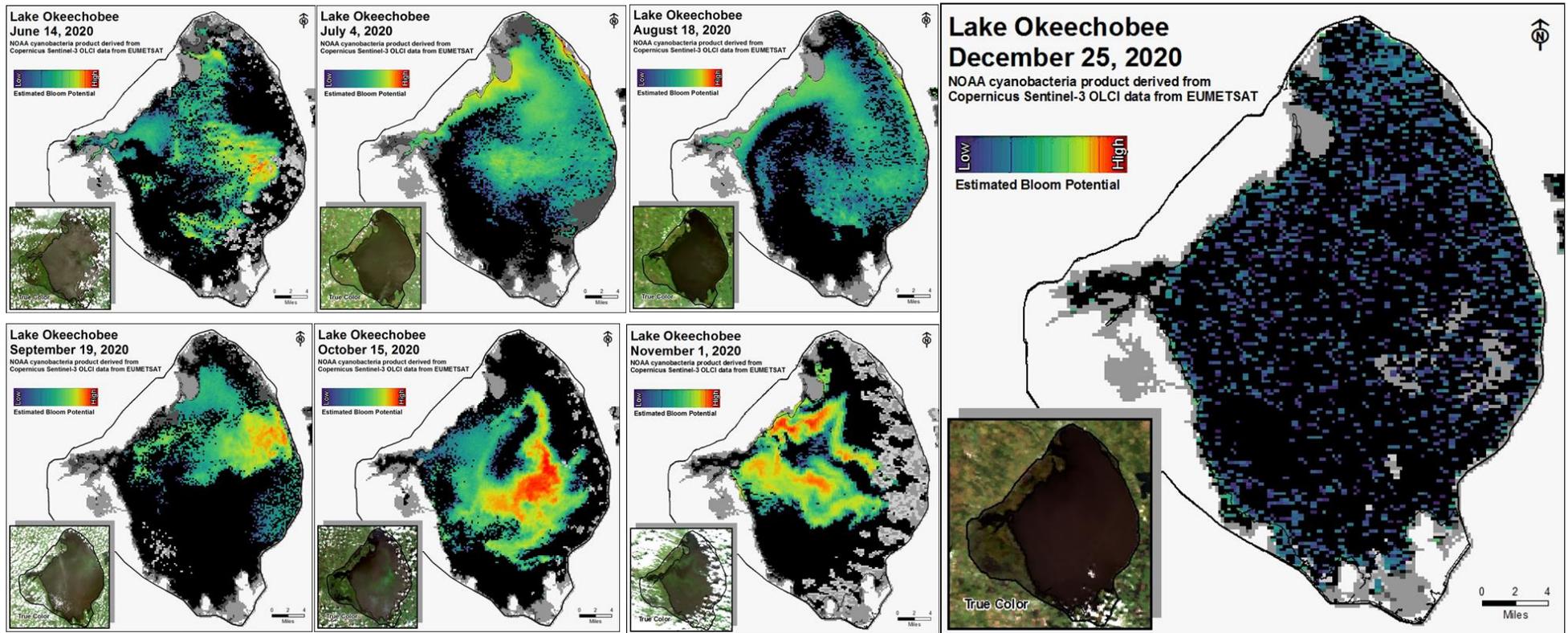


Figure 7. Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week, total inflow to the St. Lucie Estuary averaged more than 1,545 cfs (Figures 1 and 2) and last month inflow averaged more than 1,604 cfs. Note these numbers do not include contributions from the Gordy Road Structure due to missing data. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1. (Note: Recorder at Gordy Road structure was removed due to bridge construction)

Table 1. Weekly average inflows (data are provisional).

Location	Flow (cfs)
Tidal Basin Inflow	156
S-80	1220
S-308	1938
S-49 on C-24	72
S-97 on C-23	97
Gordy Rd. structure on Ten Mile Creek	Not reporting

Over the past week, salinity in the estuary increased to the US1 Bridge and decreased slightly at the A1A Bridge (Table 2, Figures 3 and 4). The seven-day moving average of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 10.9. Salinity conditions in the middle estuary are estimated to be within the good range for adult eastern oysters (Figure 3).

Table 2. Seven-day average salinity at three monitoring sites in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	7.0 (4.9)	8.9 (6.9)	NA ¹
US1 Bridge	8.7 (8.2)	13.1 (11.3)	10.0-26.0
A1A Bridge	15.3 (15.8)	21.6 (22.8)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week, total inflow to the Caloosahatchee Estuary averaged approximately 1,927 cfs (Figures 5 and 6) and last month inflow averaged about 4,200 cfs. Last week's provisional averaged inflows from the structures and the tidal basin are shown in Table 3.

Table 3. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	1420
S-78	1479
S-79	1732
Tidal Basin Inflow	195

Over the past week, salinity remained the same at the three upstream sites and about the same at the three downstream sites in the estuary (Table 4, Figures 7 & 8). The seven-day average salinity values are within the poor range for adult eastern oysters at Cape Coral and in the good range at Shell Point and at Sanibel (Figure 9). The seven-day average surface salinities (Table 4) are in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers. The current salinity conditions at Val I-75 are within the envelope of salinity 0.0-5.0 for this site (Table 4).

Table 4. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold, previous average in parentheses. The envelope at Val I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*).

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	0.2 (0.2)	0.2 (0.2)	NA ¹
Val I75	0.2 (0.2)	0.2 (0.2)	0.0-5.0 ²
Ft. Myers Yacht Basin	0.2 (0.2)	0.2 (0.2)	NA
Cape Coral	4.0 (3.8)	5.6 (4.4)	10.0-30.0
Shell Point	17.1 (17.7)	19.3 (19.4)	10.0-30.0
Sanibel	25.5 (24.9)	26.1 (25.0)	10.0-30.0

¹Envelope not applicable and ²Envelope is based on a 2-week forecast 30-day average

Forecast of surface salinity (Table 5 and Figure 10) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity to be 1.5 or lower at the end of the two week period for pulse release at S-79 ranging from 0 to 800 cfs and estimated Tidal Basin inflows of 135 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be 0.5 or lower (Table 5).

Table 5. Predicted salinity at Val I-75 at the end of forecast period

Scenario	Q79 (cfs)	TB runoff (cfs)	Daily salinity	30 day Mean
A	0	135	1.5	0.5
B	300	135	1.2	0.4
C	450	135	1.1	0.4
D	650	135	1.0	0.4
E	800	135	0.9	0.4

Red tide

The Florida Fish and Wildlife Research Institute reported on December 23, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed as a patchy bloom along and offshore of Lee and Collier counties. *K. brevis* was observed at background to high concentrations in 31 samples collected from and/or offshore of Lee County and was not observed in samples from St. Lucie or Martin Counties. No samples were analyzed this week from Miami-Dade, Palm Beach, or Broward Counties. Respiratory irritation and fish kills (suspected to be related to red tide) were also reported in Lee County.

Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are wet. The LORS2008 release guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.

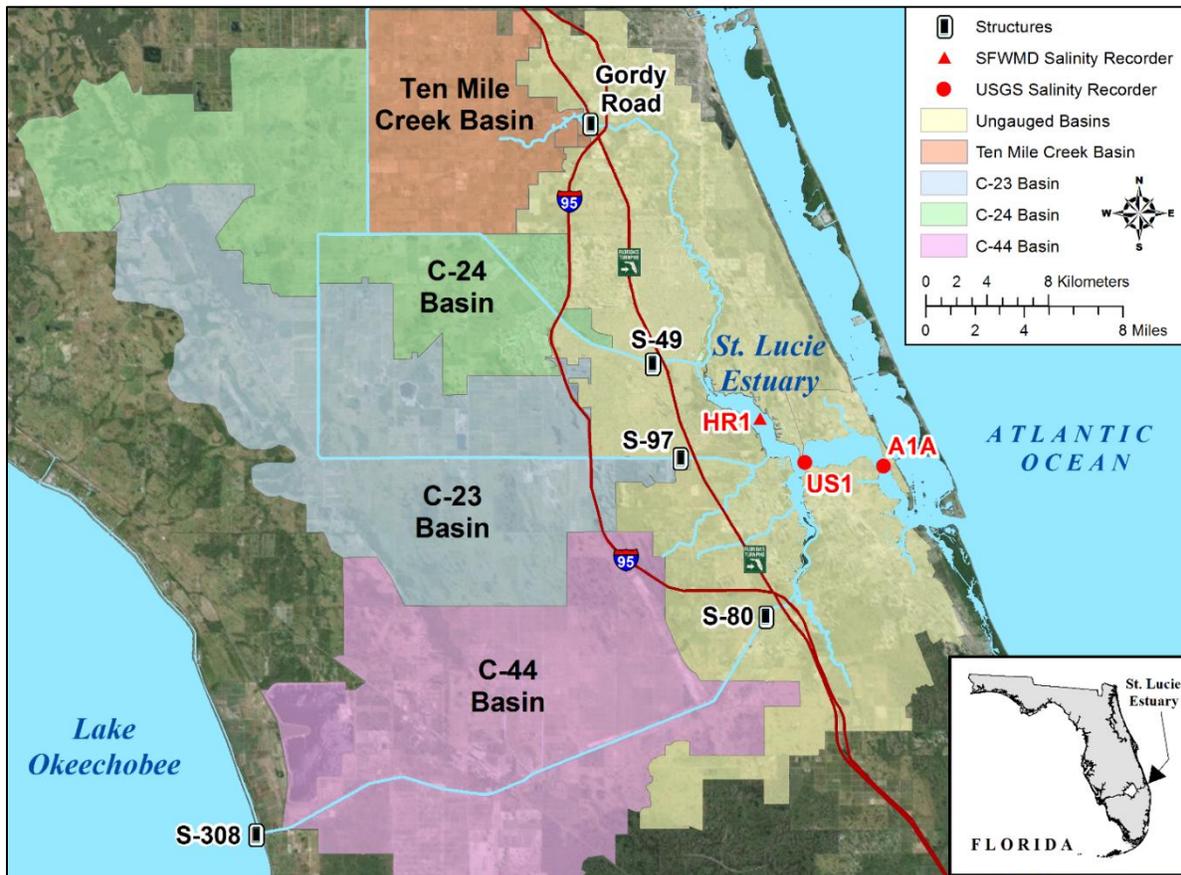


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

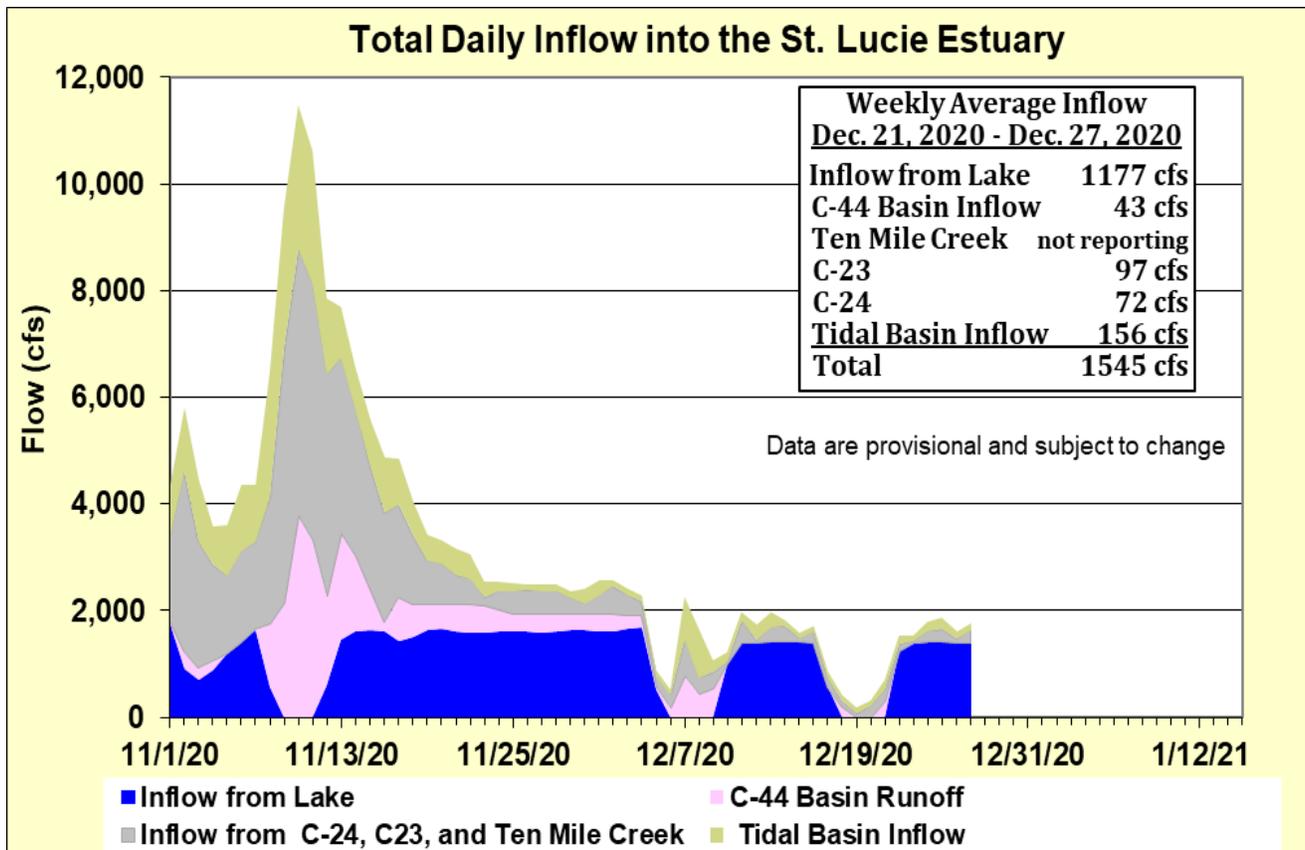


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

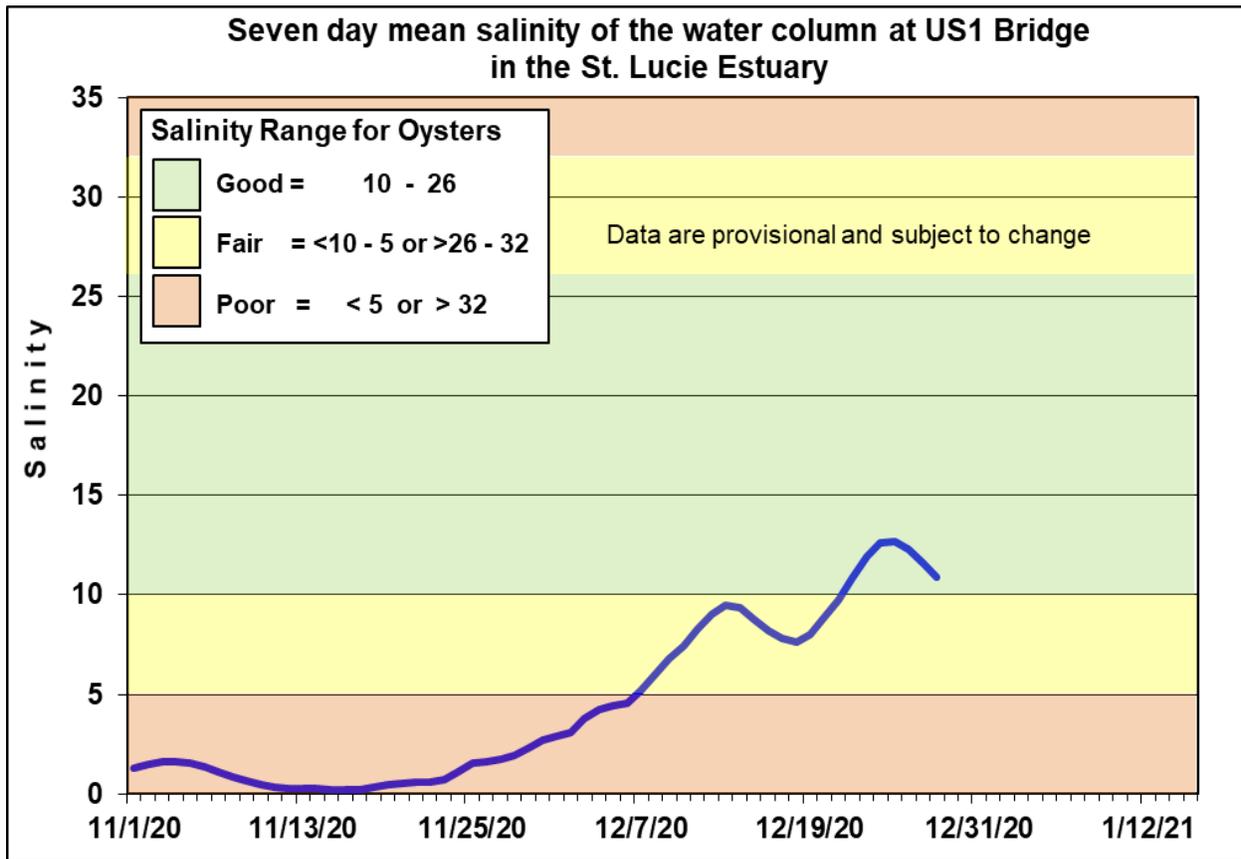


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

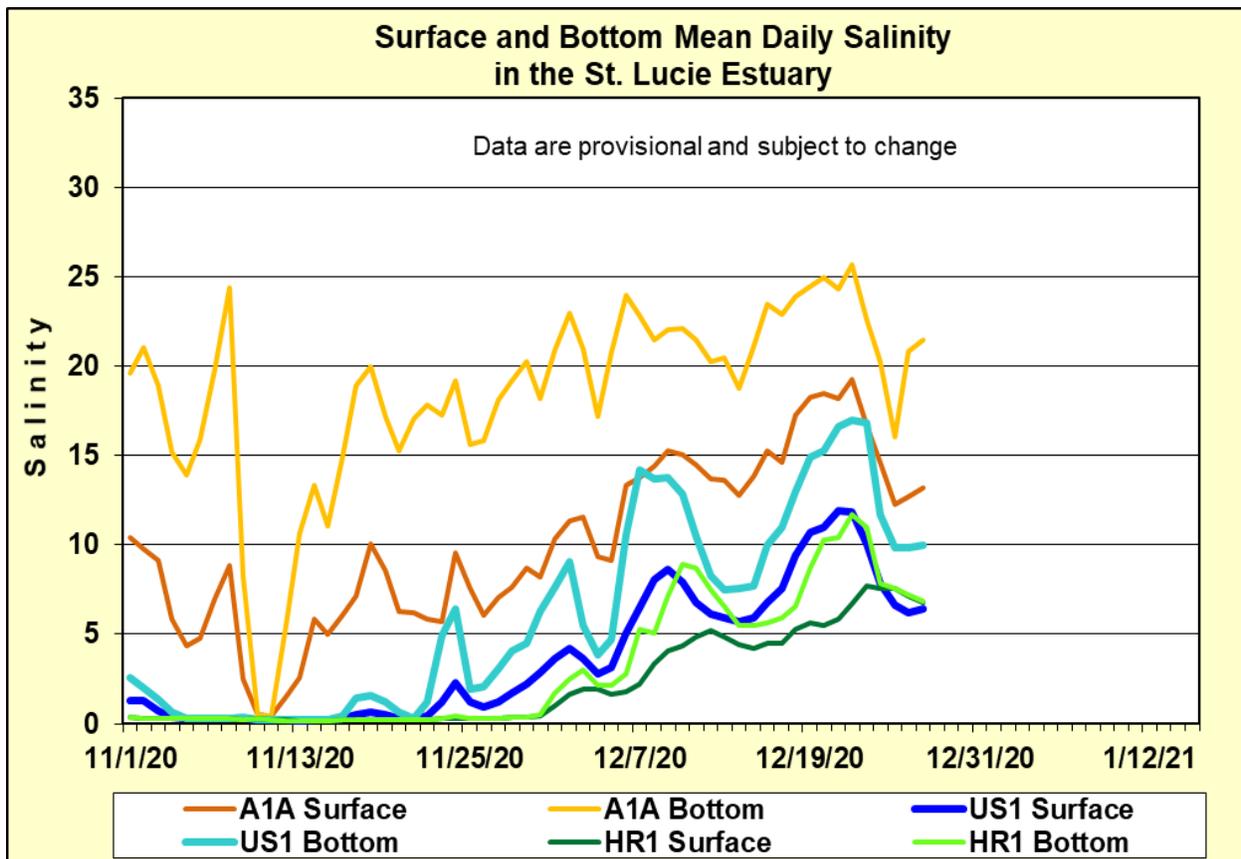


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

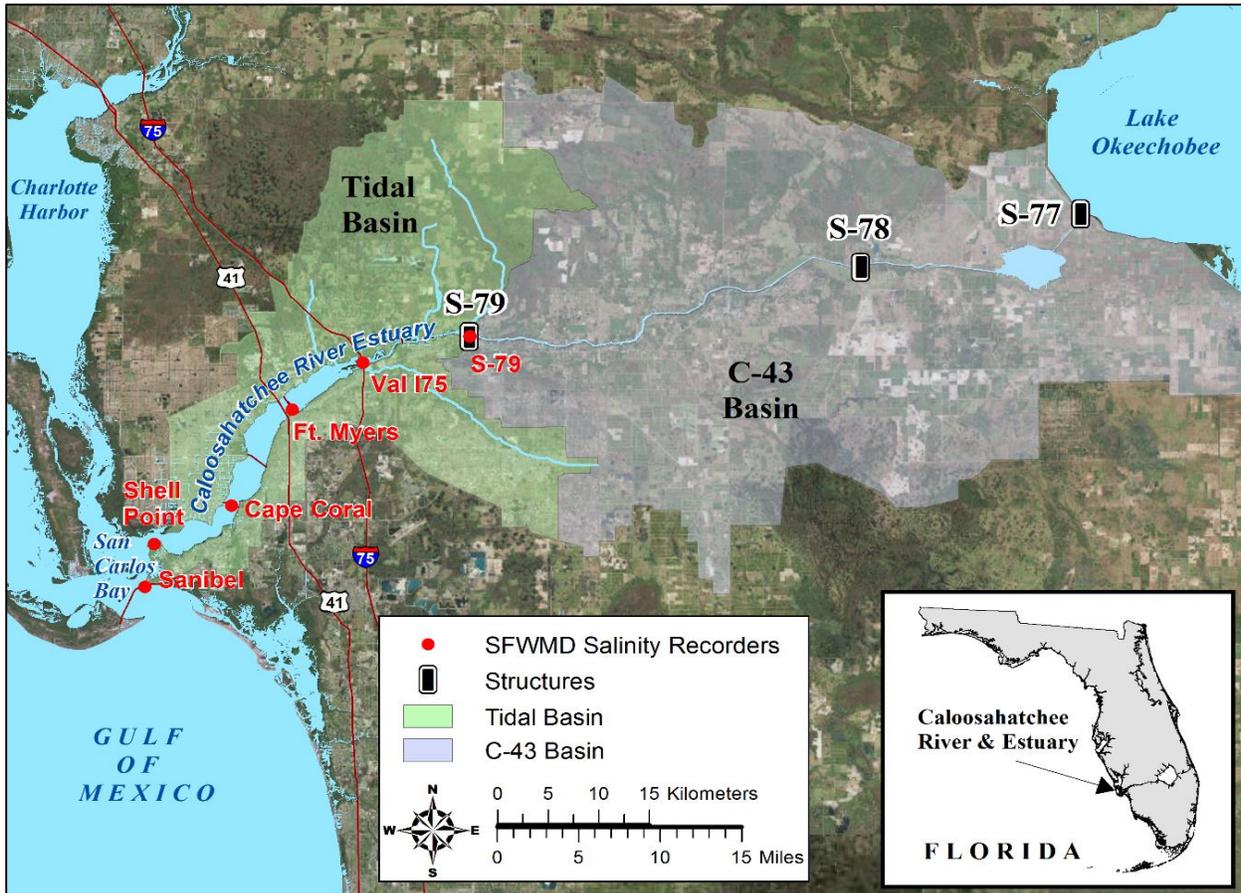


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

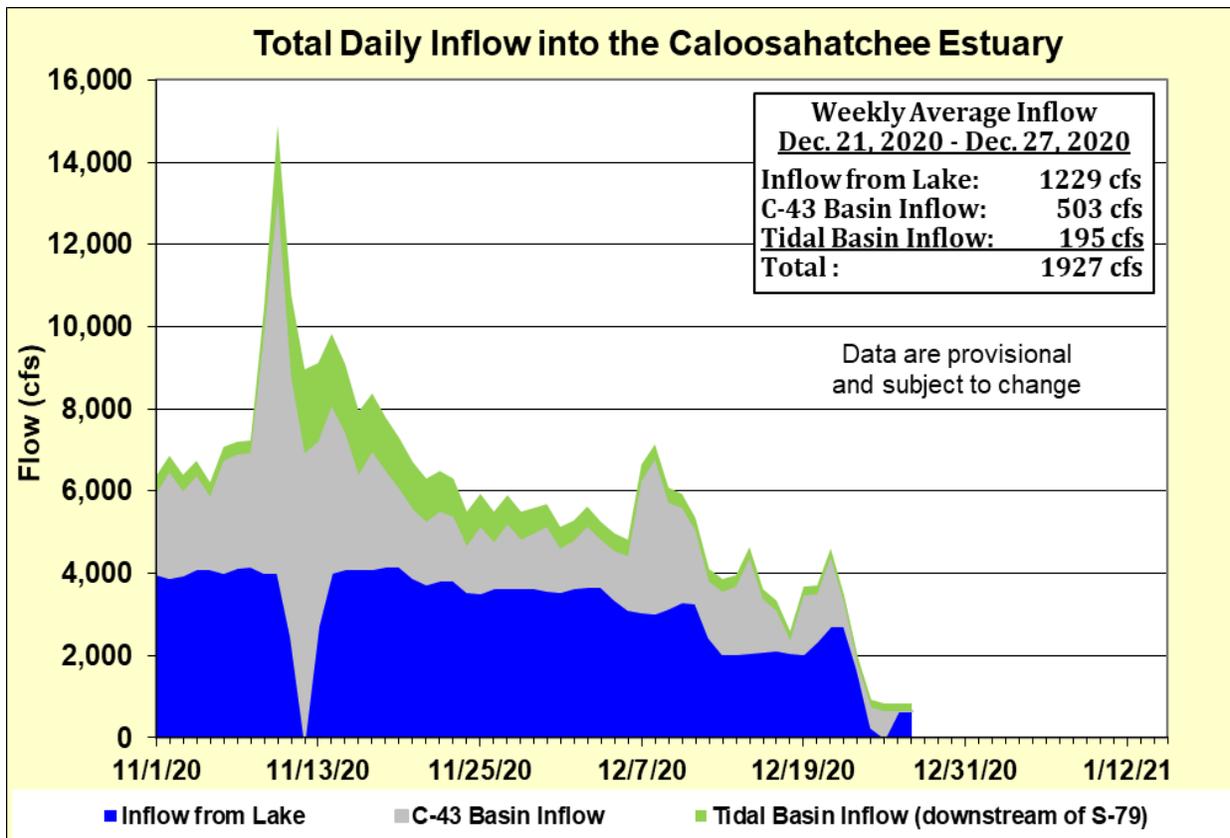


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

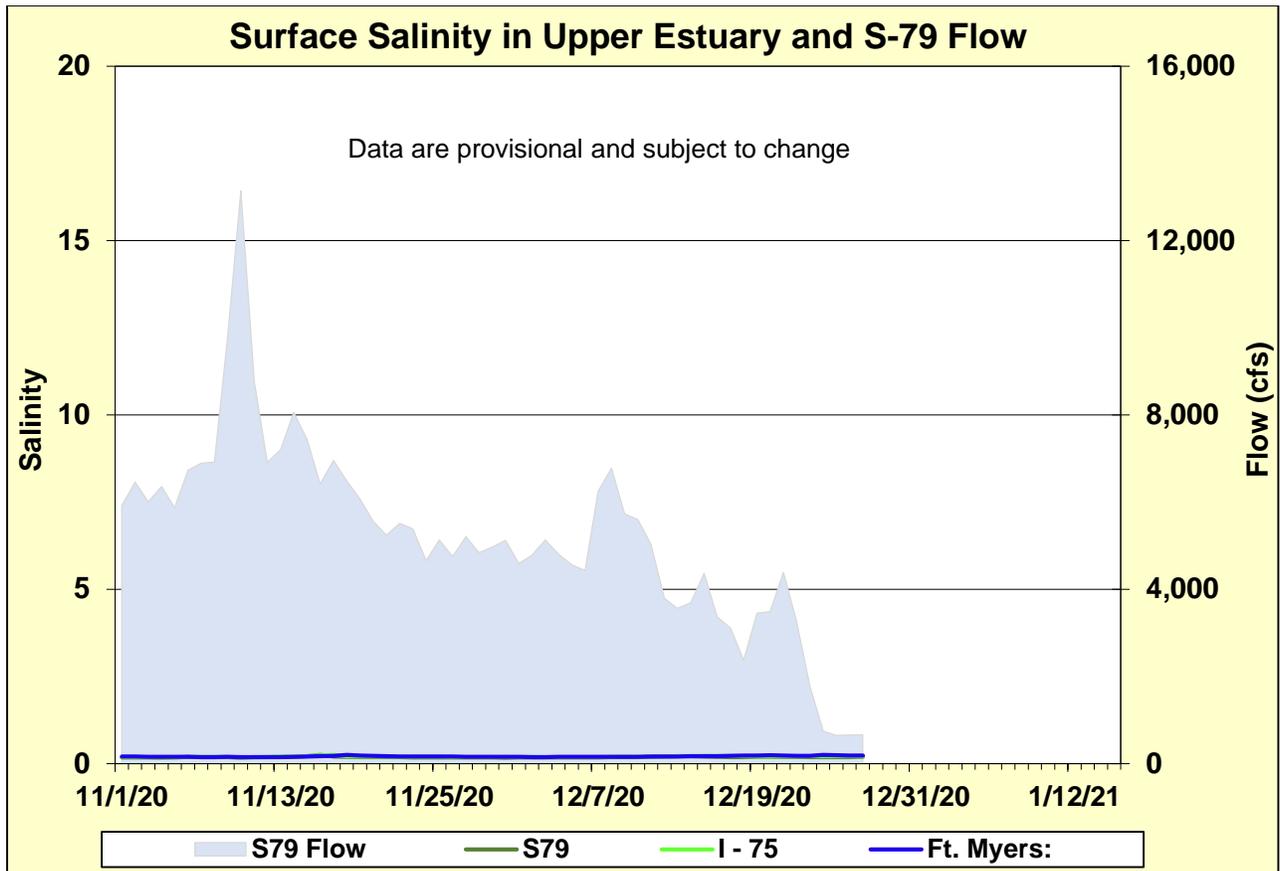


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

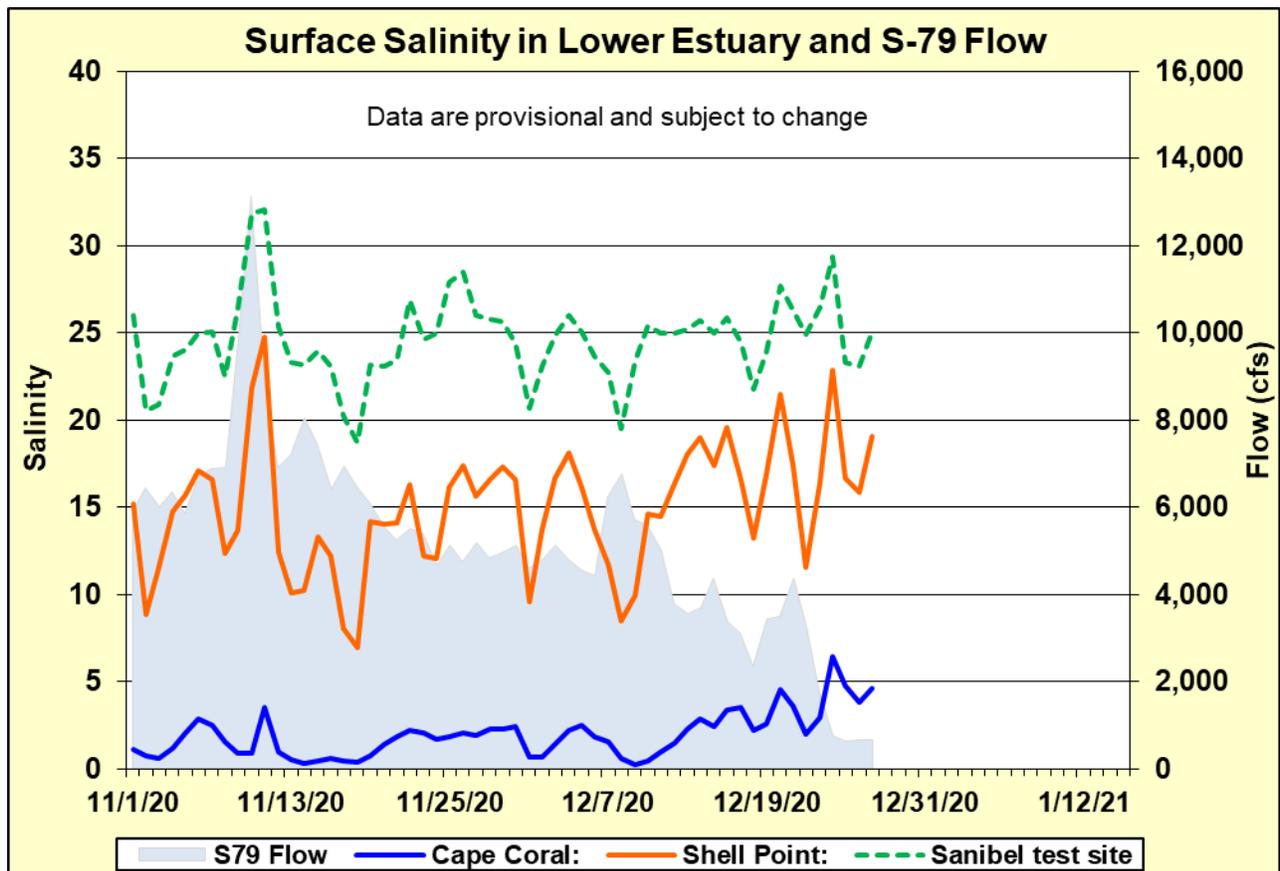


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

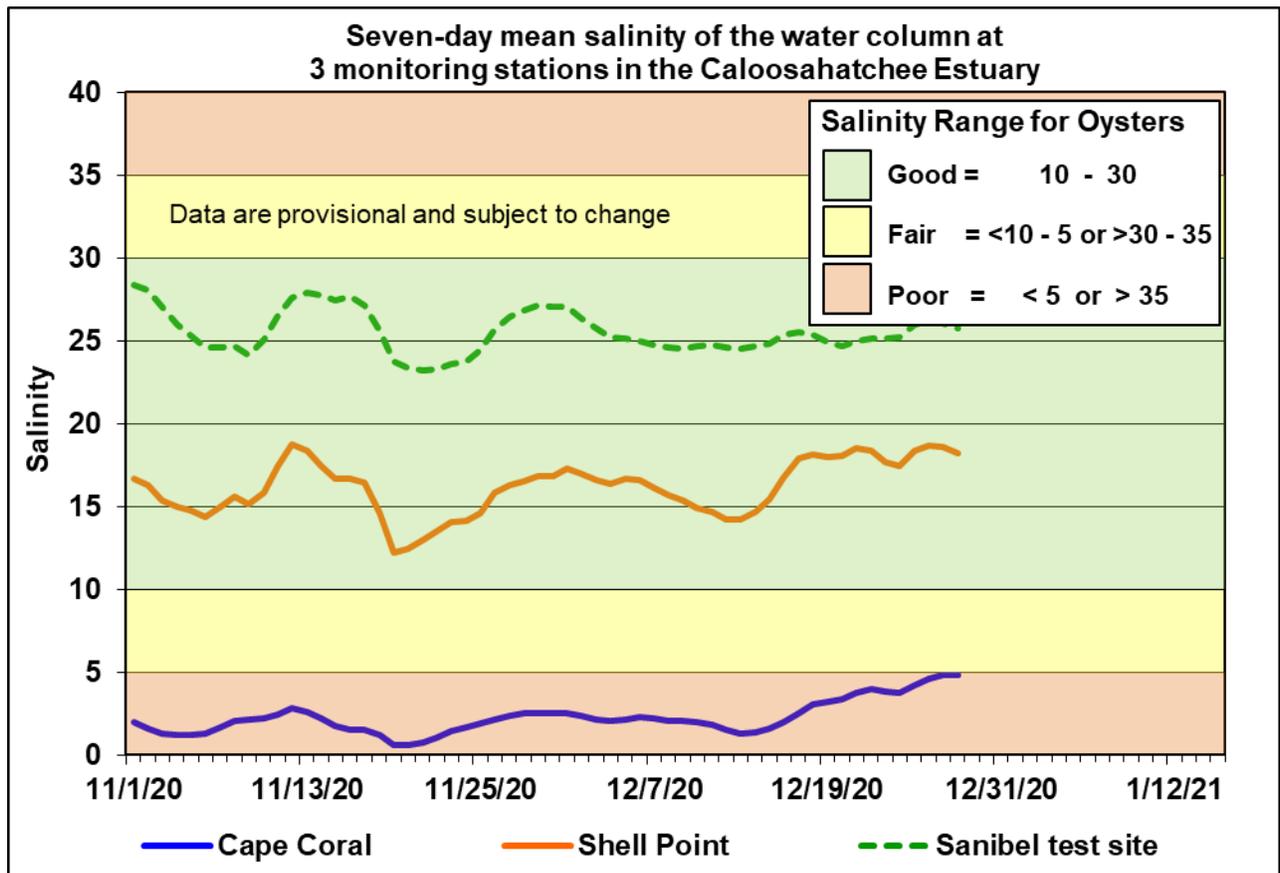


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

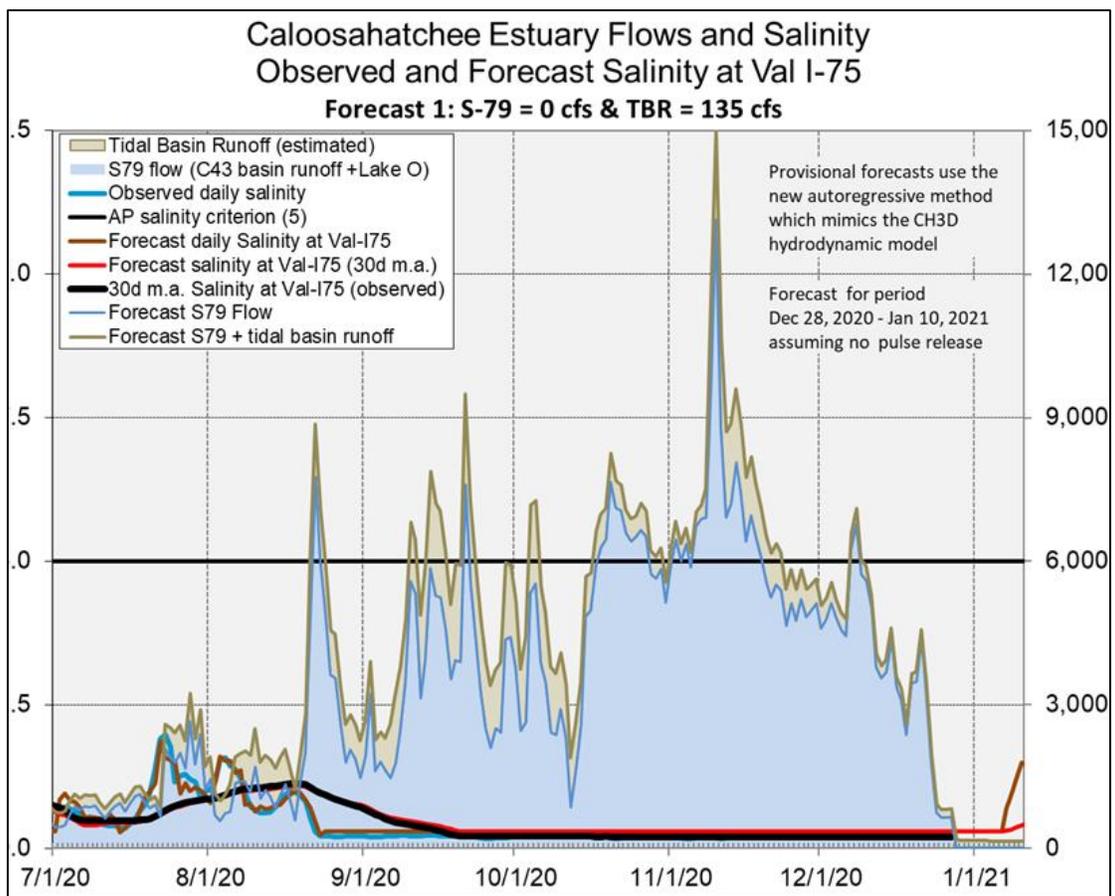
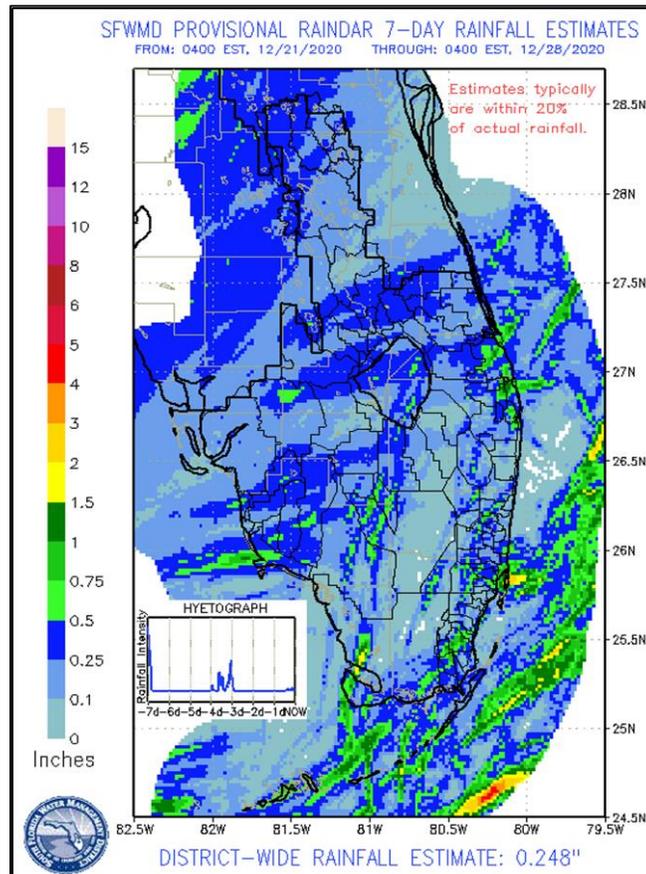


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S79.

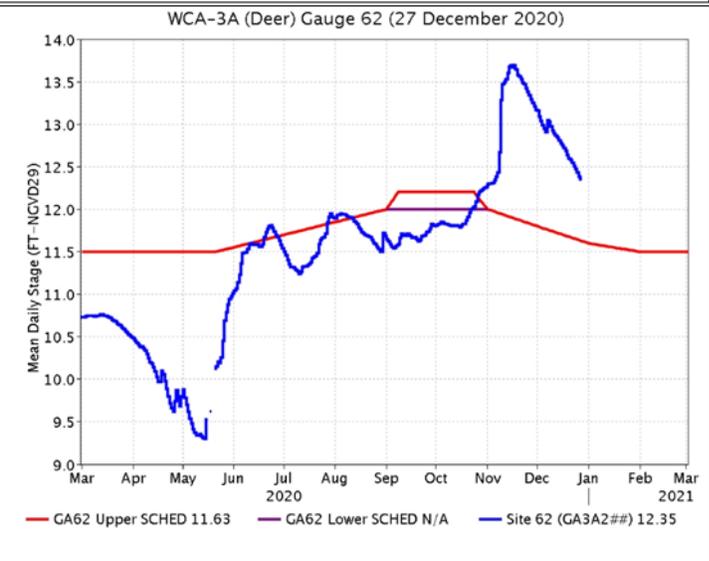
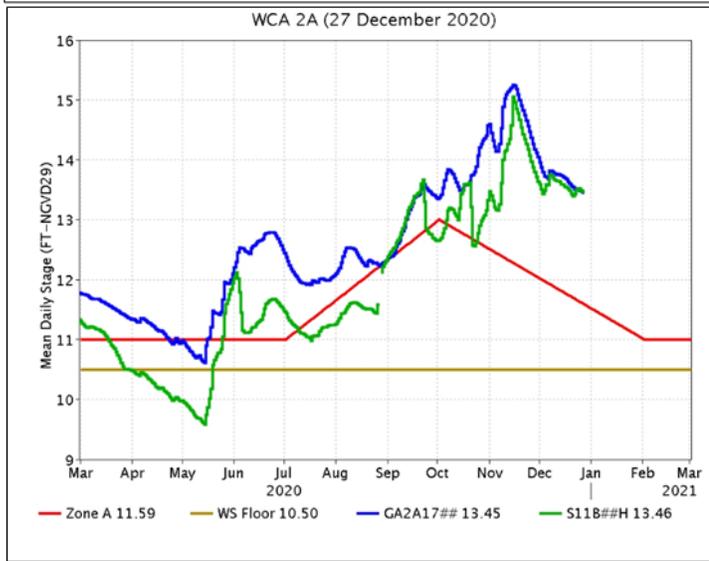
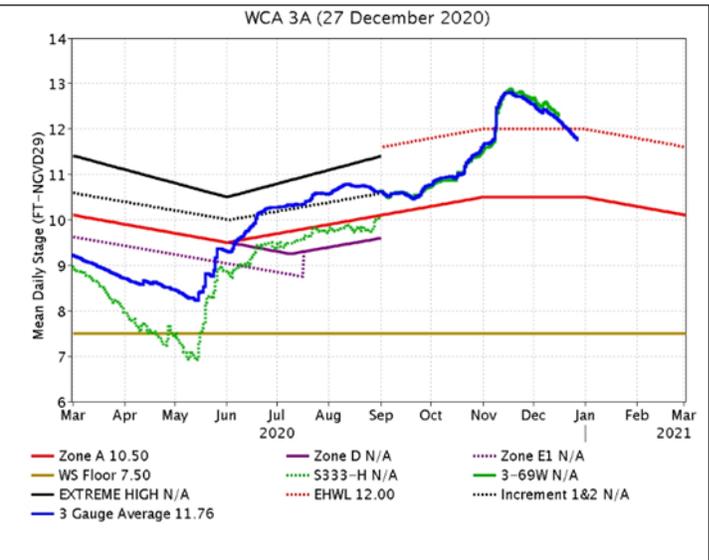
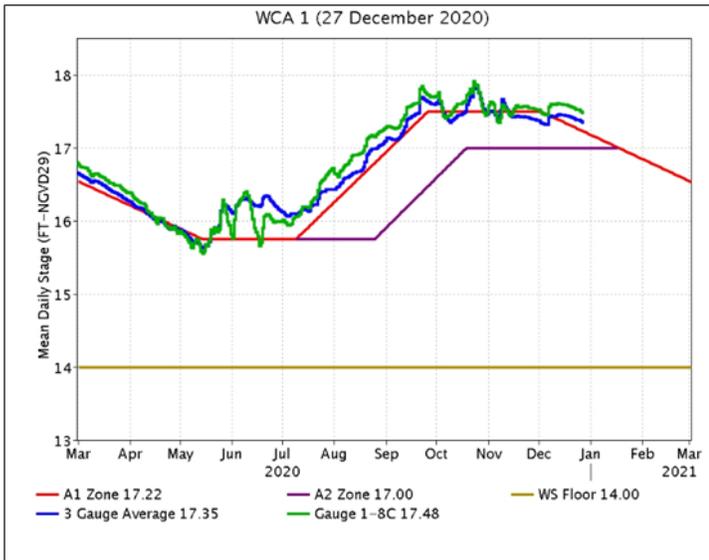
EVERGLADES

Below average rainfall across the system for the second consecutive week. At the gauges monitored for this report, stages fell 0.16 feet on average last week, for the second consecutive week stages fell the most in WCA-3A. Evaporation was 0.77 inches last week, and the TTFF continues to call for maximum releases from WCA-3A.

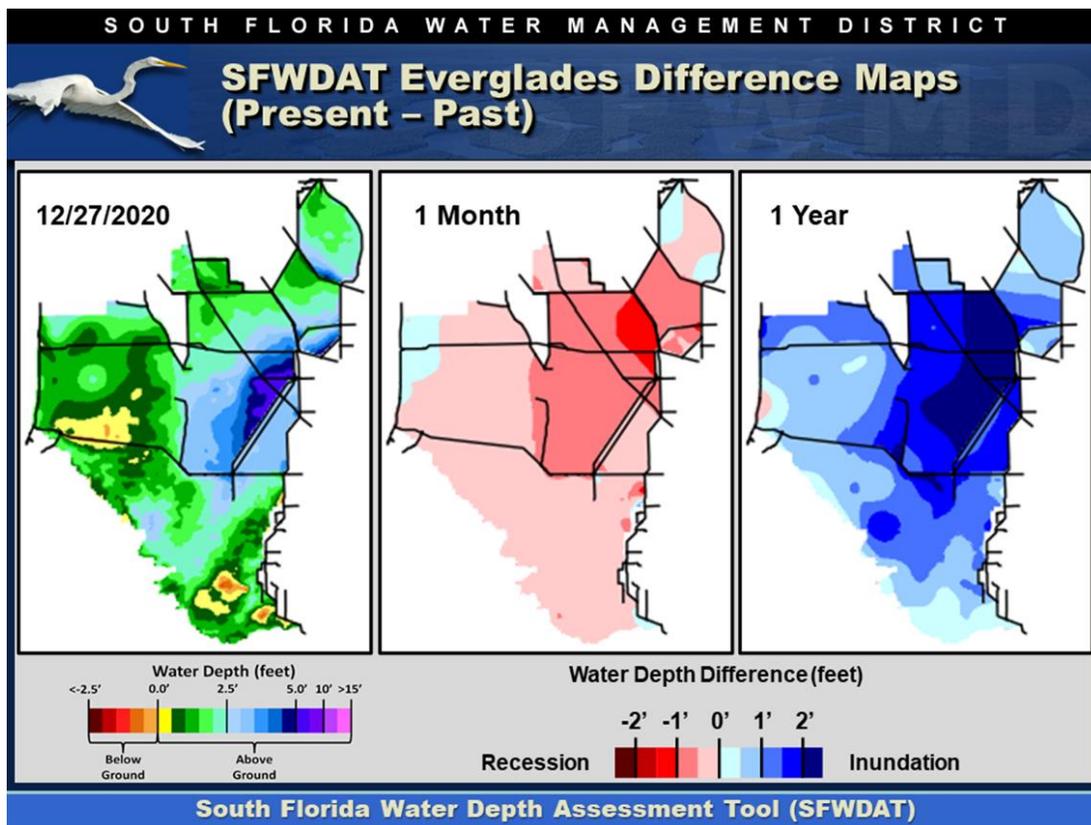
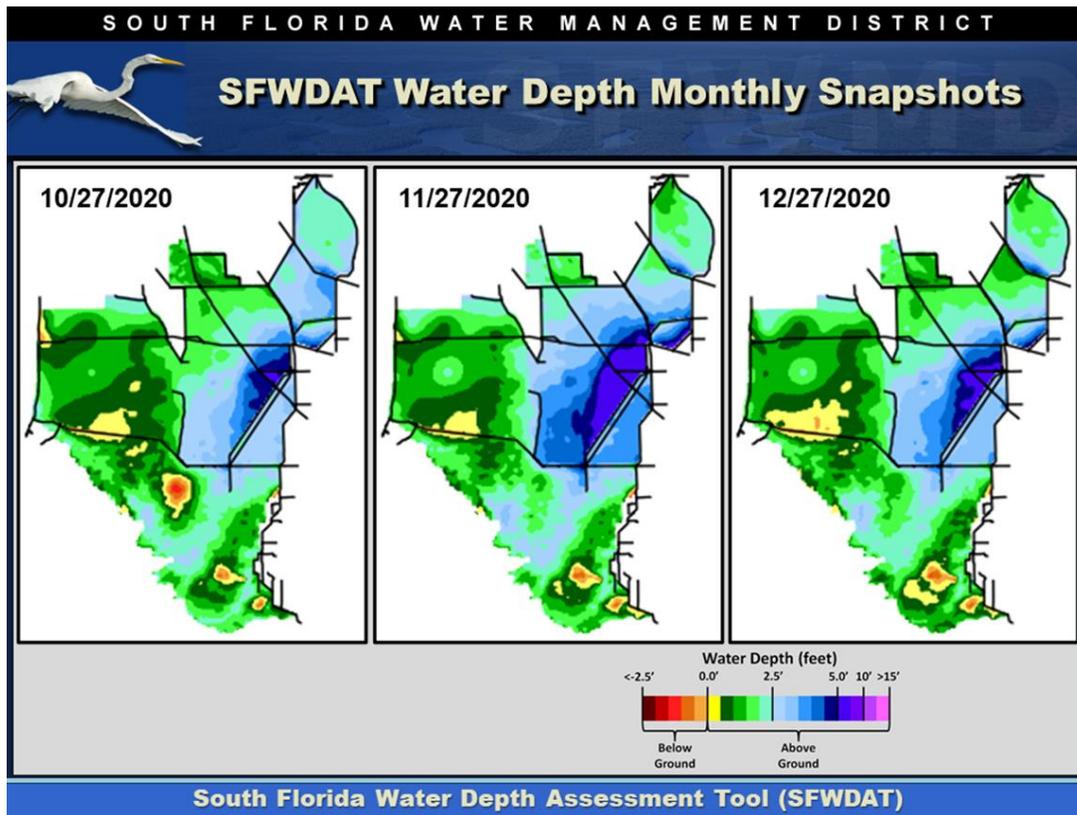
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.21	-0.07
WCA-2A	0.19	-0.12
WCA-2B	0.13	-0.15
WCA-3A	0.15	-0.27
WCA-3B	0.22	-0.16
ENP	0.22	-0.12



Regulation Schedules: WCA-1: Stage at the 1-8C Gauge is generally trending along with schedule, currently 0.26 feet above the falling Zone A1 regulation line. WCA-2A: The recession in stage at Gauge 2-17 remained moderate last week paralleling the regulation line last week at 1.86 feet above the falling schedule. WCA-3A: The Three Gauge Average stages continued to recede towards the stable Zone A regulation line last week, currently 1.26 feet above it and now below the EHWL. Northwestern WCA-3A: Stage at gauge 62 (Northwest corner) continuing to recede last week but remains above the falling Upper Schedule by 0.72 feet.

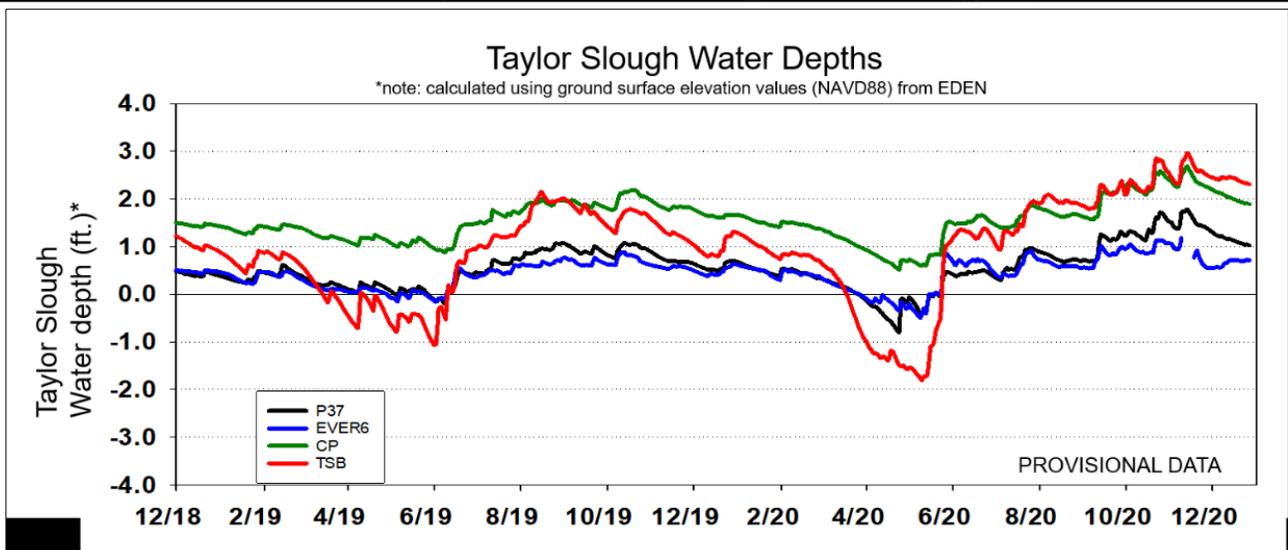
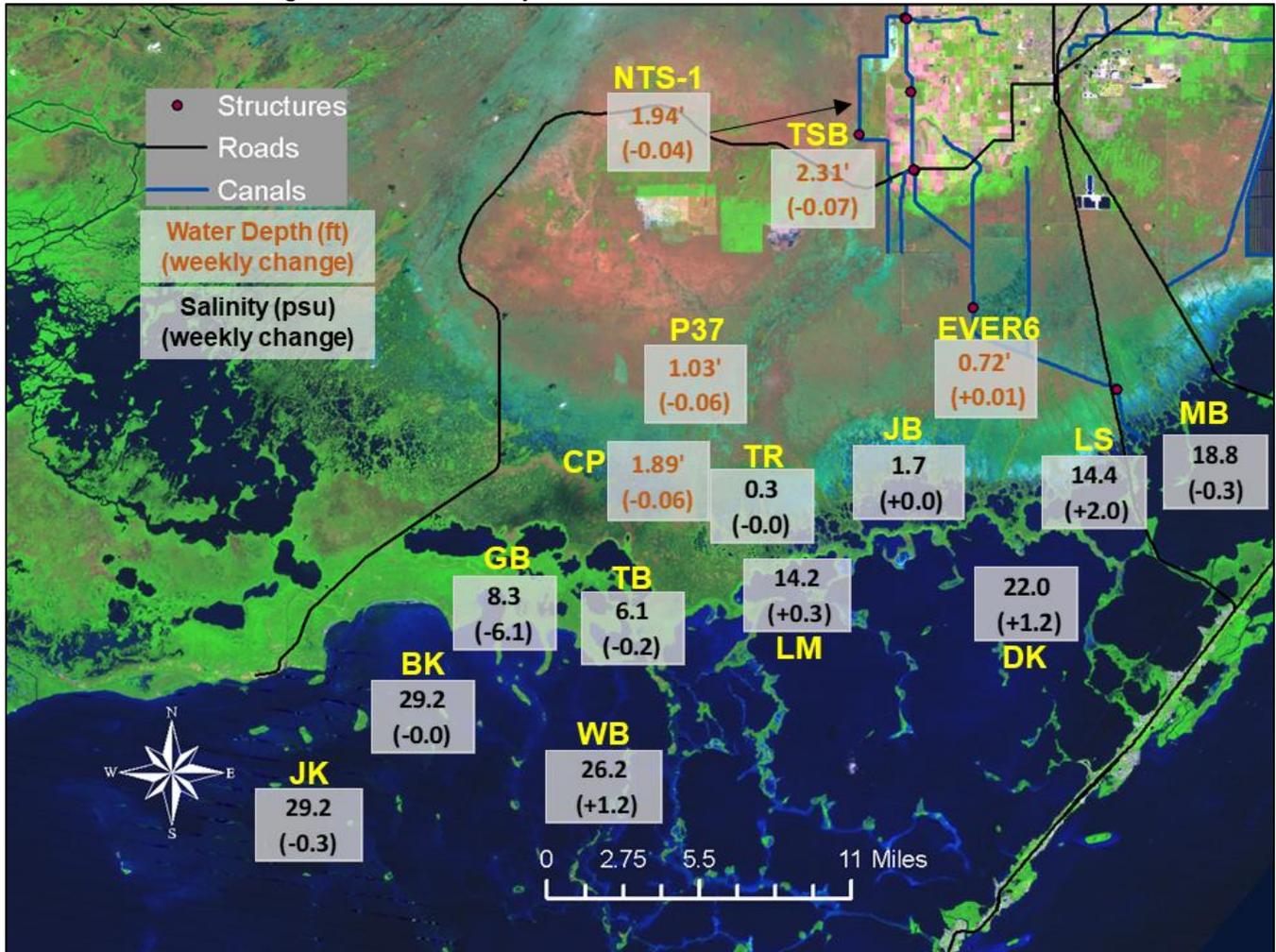


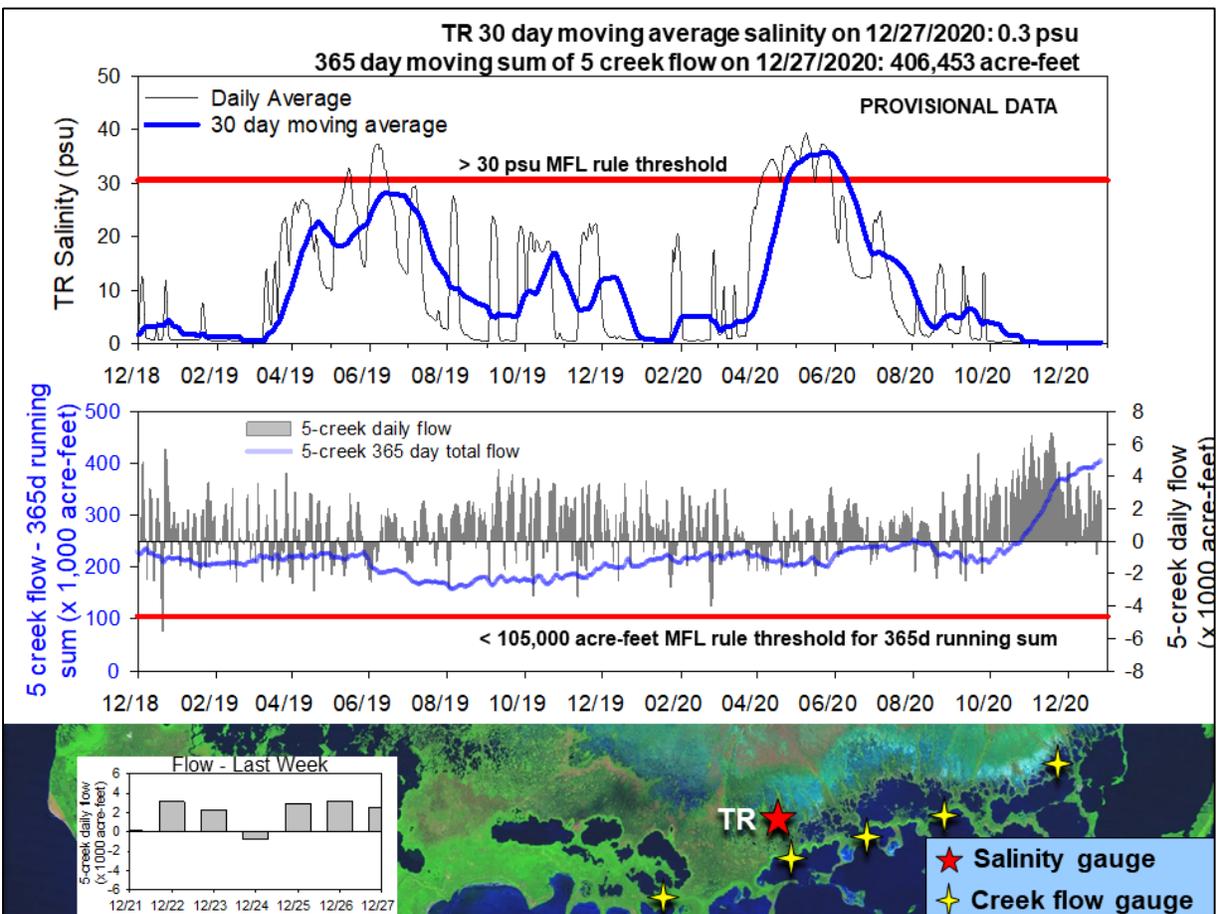
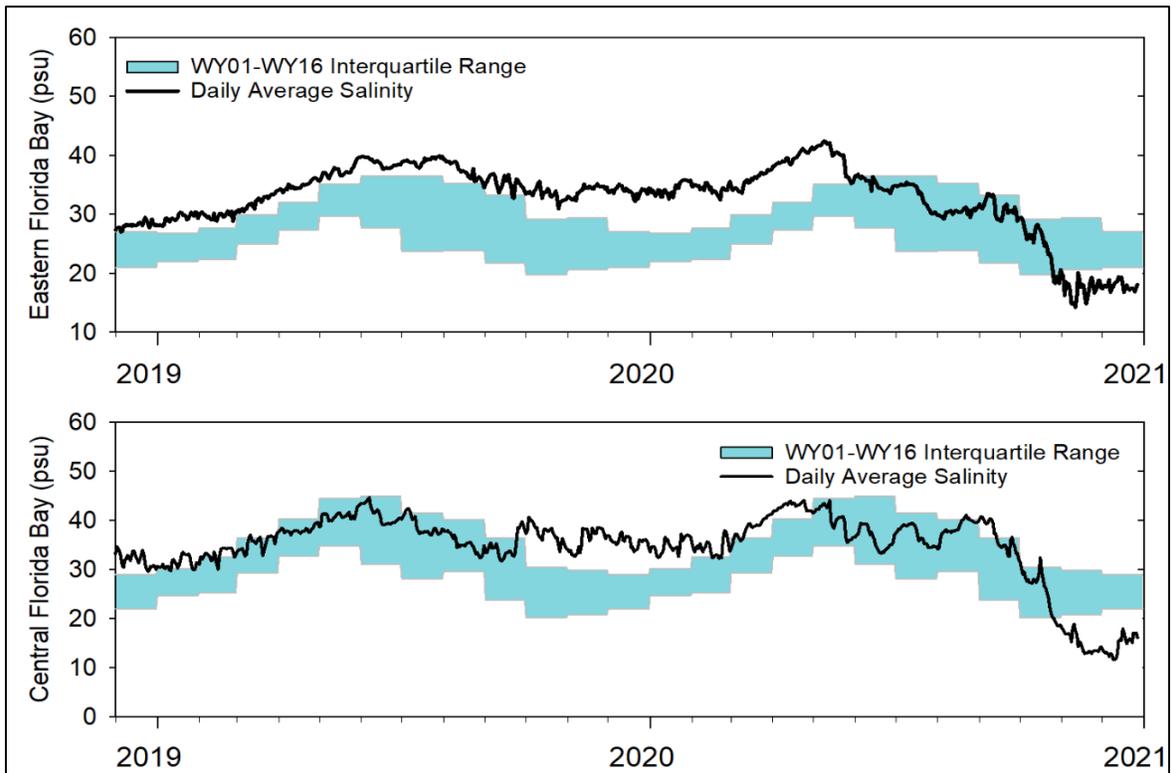
Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots indicate current depths in excess of 5.0 feet in WCA-3A South around the upper reaches of the L-67 canal but the spatial extent has lessened during that month. Flooding stress is becoming less ecologically detrimental as depths are retreating in the north of the WCAs. Only the southeastern one-quarter of WCA-2A is greater than 2.5 feet, and the northwest corner and along the northern border of WCA-3A and northern WCA-2A has the potential to be lower than 1.5 feet. Comparing WDAT water levels from present, over the last month stages fell significantly across WCA-3A (up to -1.0 feet downstream of the S-11s) and WCA-2A. Looking back one year the stage difference patterns are strikingly different than one month ago. Compared to one year ago the entire region is significantly deeper than it was a year ago, more than 2.0 feet deeper across the eastern half of WCA-3A, and more 1.0 feet in southern WCA-2A.



Tree island inundation in WCA-3A, WCA-3B and ENP: 371 Tree Islands of known elevation within WCA-3A, -3B, and Everglades National Park's Shark Slough. Current preliminary estimates using WDAT indicate that 80% or 297 of the tree islands are currently inundated (down from 85% the week prior), and 22% of those islands have been inundated for more than 120 days. Inundation for more than 120 days will cause ecological harm to sensitive islands.

Taylor Slough Water Levels: An average of 0.33 inches of rain fell over Taylor Slough and Florida Bay this past week with 0.62 inches falling over the Everglades National Park panhandle region which helps explain why this area is the only area to slightly increase in stage over the week. On average, Taylor Slough area stages decreased 0.04 feet last week. Taylor Slough is still averaging 10 inches higher than the historical average for this time of year.





Florida Bay Salinities: Salinities in Florida Bay averaged a 0.2 psu decrease over the week. Average salinity for the Bay is 8 psu lower than the historical average for this time of year while the nearshore area is 11 psu lower than the historical average. It is unusual that the central and western nearshore salinity (average of 7 psu) is lower than the eastern nearshore (14 psu), but it is not unprecedented.

Florida Bay MFL: The salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) has continued to be near fresh (less than 0.3 psu) and the 30-day moving average has also remained low at 0.3 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled just over 13,300 acre-feet (up from 12,300 acre-feet last week). The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 406,453 acre-feet this week which is a 14,000 acre-feet increase from last week. That is higher than the 95th percentile of historical data (390,830 acre-feet). This is a value not seen since October of 2012. Creek flows are provisional USGS data.

Water Management Recommendations

Few wading birds were detected in the central Everglades, where stages are high and causing stress to terrestrial wildlife. Very high numbers of wading birds were noted along the southern coast two weeks ago and conditions are indicative of a good nesting season to come. As water levels continue to recede, large numbers of ibis are expected to descend on the WCAs. Recession rates near the high end of the recommended range of -0.05 to -0.09 feet per week have ecological benefit where depths are not more than 2.5 feet in WCA-1, WCA-2 and WCA-3A North.

The current inundation pattern and duration is forcing many animals to flee to the surrounding levees and others to delay breeding activities in portions of WCA-3A. At this point in the dry season, maintaining the recession where possible in WCA-3A South and Central even when faster than traditional (but less than -.25 feet per week) ecological recession rate recommendations has ecological benefit as long as there is no downstream deleterious ecological impact.

Ponding along the L-67 canal/levee system has peaked and is now residing, however inundation of the tree islands in that region and east into central WCA-3A South has now persisted for more than 200 days which creates ecological harm in regions containing sensitive islands. Managing inflows/outflows within that region that decreases ponding in both spatial extent and the amount of time the region is inundated has benefit to the ecology of tree islands. When considering the status of tree islands in WCA-3A, the last two years of low flooding stress created a resilience to flooding stress for a single wet season. If these high stages should persist long into the dry season, ecological harm to tree islands is likely, but given the low precipitation predictions for the upcoming dry season this persistence seems unlikely as long as the District continues to maximize flows south and why at this time SFWMD Everglades ecologists are recommending a careful conservation of water in WCA-3A, once conditions move closer to average.

Continued flows towards Taylor Slough and Florida Bay maintain hydration in the marshes and lower salinity conditions within the nearshore areas of Florida Bay. Additionally, continued flows will provide a freshwater buffer against the drier-than-average dry season that is expected, which would delay the start of the salinity increases that occur within the dry season and possibly prevent the occurrence of extreme hypersaline conditions towards the end of the dry season.

More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, December 29th, 2020 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.07'	Maintain marsh stage slightly above and parallel to the regulation schedule.	Protect within basin and downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.12'	Moderate the recession rate to near -.10 feet per week and maintain marsh stage above and parallel to the falling regulation schedule.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-2B	Stage decreased by 0.15'	Maintain a recession rate to lower marsh stage.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-3A NE	Stage decreased by 0.34'	Moderate the recession rate to less than -.25 feet per week.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-3A NW	Stage decreased by 0.24'	Maintain the recession rate until marsh stage returns to more average conditions.	
Central WCA-3A S	Stage decreased by 0.26'	Maintain the recession rate to return marsh stage to more average conditions.	Protect within basin, upstream/downstream habitat and wildlife. Tree island ecology is diminished by flooding
Southern WCA-3A S	Stage decreased by 0.23'		
WCA-3B	Stage decreased by 0.16'	Maintain the recession rate to lower marsh stage.	Protect within basin and downstream habitat and wildlife from flooding stress. Tree island ecology is diminished by flooding
ENP-SRS	Stage decreased by 0.12'	Make discharges to the Park according to the current deviation with a return to COP protocol as soon as high water conditions are alleviated in the upstream WCAs	Protect within basin and upstream habitat and wildlife from flooding stress.
Taylor Slough	Stage changes ranged from -0.07' to +0.01'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -6.1 to +2.0 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.